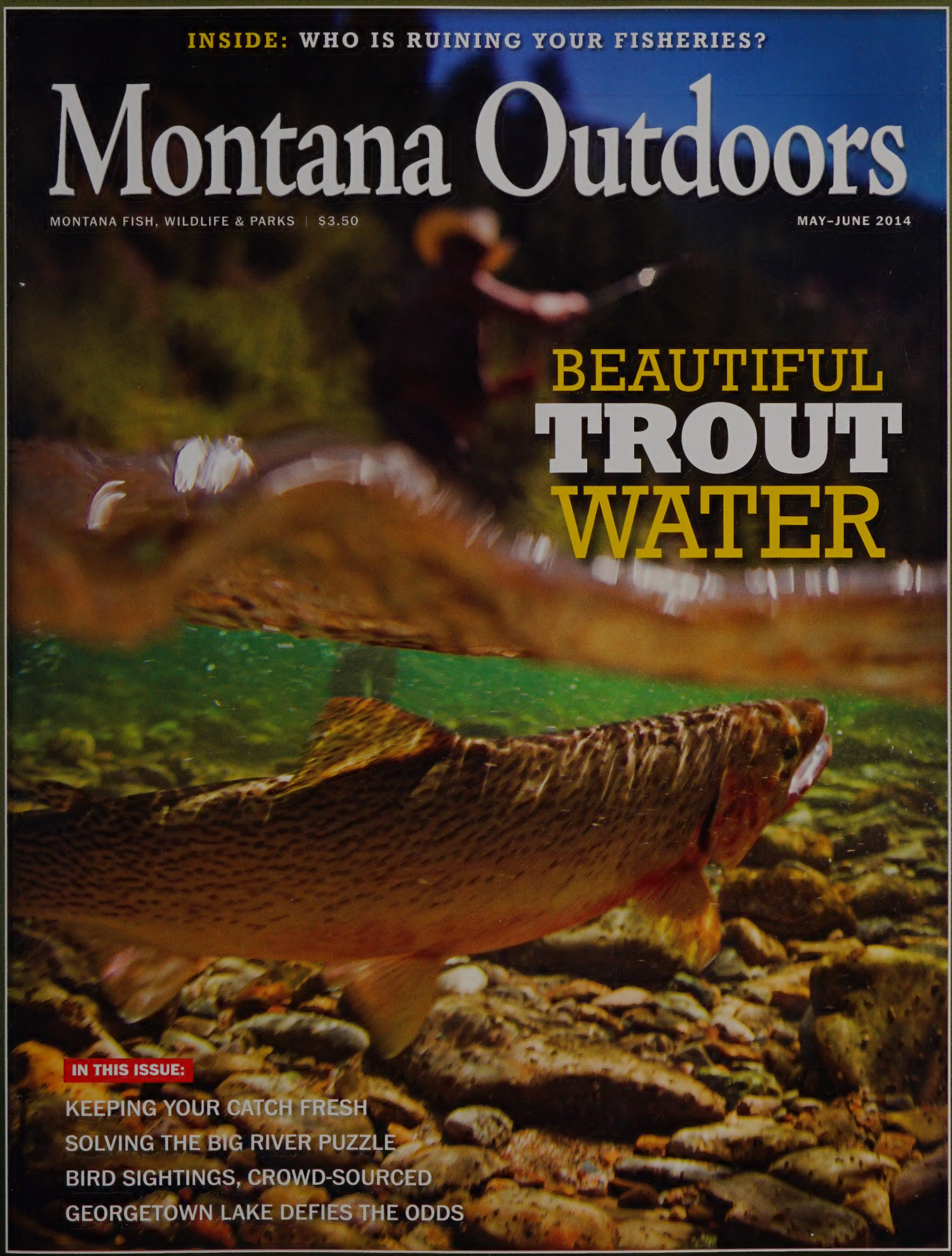
INSIDE: WHO IS RUINING YOUR FISHERIES?

Montana Outdoors

MONTANA FISH, WILDLIFE & PARKS | $3.50

MAY–JUNE 2014



BEAUTIFUL TROUT WATER

IN THIS ISSUE:

KEEPING YOUR CATCH FRESH

SOLVING THE BIG RIVER PUZZLE

BIRD SIGHTINGS, CROWD-SOURCED

GEORGETOWN LAKE DEFIES THE ODDS

Montana Fish, Wildlife & Parks

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Montana Outdoors

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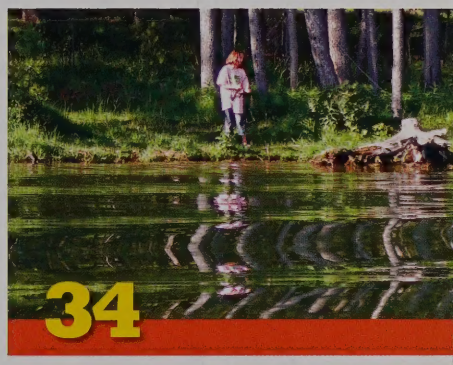

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WELCOMING WATER
Wading a mountain stream in western Montana. See more of the state's loveliest trout waters starting on page 24. Photo by Victor Schendel.

FRONT COVER
Photographer Bill McDavid combines two worlds while showing a westslope cutthroat trout being played in a central Montana stream.

More folks weigh in

"Weighing in on Wolves" (March-April) was a thoughtful and well-balanced piece covering the ongoing issue of wolves in Montana. While I support wolves being returned to and managed at more socially tolerable levels in our environment, I was particularly struck by the irony of Yellowstone National Park wildlife and wolf guide Nathan Varley's comment, "Every park wolf that steps over the border into Montana and Wyoming and gets shot is money out of our pocket." Alas, how many times have we heard wolf advocates discount the same claims made by hunters and outfitters bemoaning the loss of income and elk hunting opportunities in the regions around YNP that have come about with the drastic decline in the park's elk population following wolf reintroduction? Funny how that "shoe on the other foot" thing works.

Denver Bryan
Bozeman

I appreciated your effort to produce a balanced article on wolves, but you missed several points. The most important one is that the wolf was recovered on the hunter's dime (the rancher's, too, but that is another story), and that hunters' acceptance of wolves ensures the animal's long-term prospects. Hunters protect and conserve game species. They generate the necessary revenue through the Pittman-Robertson Act, stamps, licenses, and donations. Pro-wolf organizations spend nothing on conservation, only on litigation. For instance, why is there no Rocky Mountain Wolf Foundation, or Wolves Unlimited? The Northern Rockies wolf population has been recovered for 13 years, yet forces are still trying to get them back on

WEIGHING
IN ON WOLVES
Montana works to strike a fair and biologically sound balance between having enough of the large carnivores and having too many.

the list of threatened and endangered species. Wolves are safe under state management. But if you are concerned, then help with wolf conservation. Buy a hunting tag and don't use it (to provide FWP money for wolf monitoring), or join a conservation organization. But stop giving money to groups that spend it on litigation. Funding them doesn' t help wolves; it alienates the group that can conserve wolf populations over the long haul: hunters.

Mark Brust
Kila

Regarding the article "Weighing in on Wolves": Where do you people come from with your thought process? Since when does FWP concern itself with wildlife guides pursuing dollars in Yellowstone National Park viewing wolves? YNP is in Wyoming. It is also a unique and artificial ecological system supported for the benefit of tourism and supervised by the National Park Service. If they want wolves in YNP, that is their own business. Here in Montana, the largest single industry is cattle, with a $1 billion gross per year. This has been placed at considerable financial loss in recent years due to the encroachment of the wolf on cattle habitat. This loss consists of reduced weight of steers and heifers on pasture, and reduced successful pregnancies and condition of mother cows. This loss is running into the tens of millions of dollars per year. Talk about economic impact. Is it any wonder that stockmen adorn their pickups with "Shoot, Shovel, and Shut Up" stickers?

Randy Pedersen
Butte

Admirable focus

I thoroughly enjoy each issue of *Montana Outdoors*. It is truly a fantastic and educational magazine. I feel there are currently too many other Montana magazines featuring "the best place to play" in our beautiful state. I admire yours for putting more focus on wildlife, history, management, and conservation.

Joede Warne
Belgrade

What about porcupines?

The November-December 2013 issue included a short piece about porcupines and their cravings for salt on axe handles, gloves, and such. My wife has turned her yard and garden into an oasis. As the surrounding range and timber start drying out in mid- to late summer, porcupines are drawn to the lush green of her gardens, shrubs, and trees. I would prefer not to have to shoot the porcupines, but I've had very little success trying to live-trap them. No bait seems to work, and I've tried fried salt, celery, carrots, apples, and fresh willow branches. Do you have any suggestions?

Dave Gano
Melville

Cut an apple into eight pieces and salt liberally. Place two pieces outside the trap, two just inside the trap door, and the remainder behind the trip pan. If that doesn't work, you can always try an old ranch glove or axe handle.

The November-December issue mentions live trapping and relocating nuisance porcupines. Several years ago I was asked by another government agency to relocate some problem wildlife on their property. I called FWP and was told by a biologist that, under game code 87-5-711, moving wildlife was not legal. Even if it were legal, I know from experience that all you are doing is moving your problem animal onto someone else's land. All or most relocated wildlife, such as raccoons, skunks, and porcupines, will try to get back to home turf and will likely end up as road kill.

Dave Salys
Big Sky Wildlife Control Services
Billings

The game code you cite was intended to prevent people from moving elk and other game species around; catching and keeping foxes, bobcats, and other dangerous wildlife as pets; and getting bit or scratched by species carrying rabies. Because porcupines are not a protected species, there is nothing illegal about trapping one and relocating it many miles away in a forest. (Like any warm-blooded animal, porcupines can carry rabies, but cases are extremely rare.) ■

Fish Curry

By Tom Dickson | Preparation Time: 25 min. | Cooking Time: 20 min. | Serves: 4

Montana has many things to offer residents and visitors, but spicy, aromatic food is not on the list. Especially lacking are restaurants that serve curry dishes—spicy, aromatic stews considered worldwide to be among the most flavorful foods.

Fortunately, curries are easy to make at home. And because they work with all types of fish and meat, including game, they provide a welcome addition to any household working its way through a freezerful of venison, perch, kokanee, or other fish and game.

Curry is two things: a powdered combination of spices—usually turmeric, coriander, and cumin—and any dish made using that powder, sometimes with the addition of coconut milk. A typical curry recipe starts by browning onions, ginger, and garlic in oil or butter, adding curry powder and a cinnamon stick along with stock and coconut milk, then adding tomatoes and meat or fish. The ingredients are covered, cooked awhile longer, then ladled over cooked white rice.

Curries are most prominent in Southeast Asia and the Indian subcontinent, where each country or region is known for distinct variations. It's a lot like barbecue in the United States, where styles and flavors vary widely from state to state and region to region.

Learning the various forms of curry is a fine culinary art practiced by master chefs. All most of us need to know is that a curried game dish tastes out of this world. Here I offer an easy fish curry you can use with any Montana fish species.

If you and your family like this dish and want to try versions for curried venison or pheasant, visit the *Montana Outdoors* website and look under "Recipes."

—Tom Dickson is editor of Montana Outdoors.

SHUTTERSTOCK

INGREDIENTS

1 lb. boneless, skinless fish fillets (perch, drum, pike, walleye, trout, kokanee, or catfish all work well. Non-anglers can use cod, available in any grocery store.)
1 T. vegetable oil
½ onion, grated on large holes of box grater (this makes for a thicker sauce)
2 t. fresh ginger, grated
2 cloves garlic, finely minced
½ lb. fresh green beans (optional), **trimmed to 1-inch pieces**
14.5-oz. can diced tomatoes
2 t. curry powder (see recipe below)
½ t. salt
½ t. black pepper
1 c. coconut milk (found in any grocery)
¼ c. water
Cooked white rice (preferably basmati or jasmine)
Handful of cilantro leaves, chopped

DIRECTIONS: Wash fillets and pat dry. Cut into 2-inch chunks.

Heat oil in a medium saucepan over medium heat. When oil is hot, add onion, ginger, and garlic. Sauté 5 minutes, until very fragrant.

Use a spatula, potato masher, or your hands to break down tomatoes. Add to pan (along with fresh green beans, if desired) and sauté for another 3 minutes, stirring frequently.

Add curry powder, salt, and pepper. Stir to combine and cook for 2 minutes.

Turn heat to medium-high. Add coconut milk and water. When mixture comes to a boil, add fish and cook for 4 minutes or so, until all chunks are cooked through.

Serve on cooked white rice. Top with cilantro.

HOMEMADE CURRY POWDER

2 T. coriander seeds **1 T. cumin seeds**
1 T. fennel seeds **½ t. ground turmeric**
1 T. crushed red pepper flakes

In a medium pan, spread pepper flakes and coriander, cumin, and fennel seeds in a thin layer. Toast spices on medium heat, shaking the pan often, until they turn color and become fragrant, about 5 minutes. Cool. Using a spice grinder, old coffee bean grinder, or mortar and pestle, grind toasted spices into a fine powder. Add turmeric and blend once more until everything is combined. Store in an airtight container for up to two months.

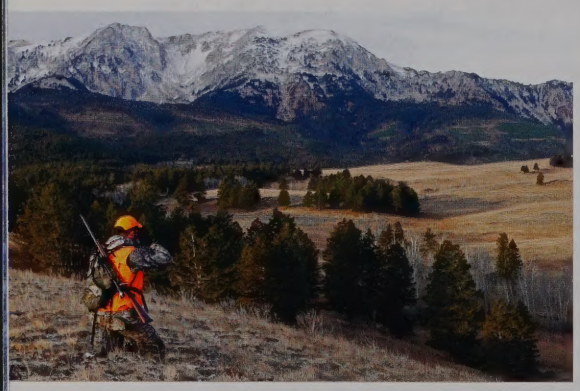
The choice will be yours

Management of Montana's fish and wildlife—and, as a result, your hunting and fishing—could soon be in trouble. Soon there won't be enough money to sustain this department's work. Over the next year hunters, anglers, and lawmakers will need to decide whether to increase FWP's revenue or have us do less fish and wildlife management.

Almost all of FWP's revenue comes from hunting and fishing license fees—of which nonresidents contribute about 70 percent—and federal taxes on hunting and fishing equipment. Less than one-half of 1 percent of our fish and wildlife budget comes from the state's general fund.

The Montana Legislature last approved a resident license fee increase in 2005. Since then, FWP's revenue has remained flat. It even dropped in recent years due to fewer nonresident licenses sold (from declines in eastern Montana deer and pronghorn numbers after tough winters in 2010 and 2011, from the misconception that wolves are eating all the state's elk, and due to the weak national economy).

Meanwhile, inflation has steadily increased the cost of everything we use to manage fish and wildlife—from the gas in a game warden's truck to the electricity required to run the state's eight fish hatcheries. Plus, this department is shouldering additional responsibilities, many from federal and state mandates. These include timber planning and harvest on wildlife management areas, wolf and bison management, and trying to prevent endangered species listing of arctic grayling, wolverines, fisher, and sage-grouse. We've also had to spend more time and money monitoring for brucellosis, chronic wasting disease, and aquatic invasive species; reviewing potential disruption to fish and wildlife habitat from development; and helping more cities and towns deal with growing numbers of bears, deer, and other urban wildlife.



There's a growing gap between the revenue we receive and what we must spend to manage Montana's fish and wildlife. Something has to give.

The bottom line: We have more work to do but less money with which to do it. As a result, the gap continues to grow between the revenue we receive and what we must spend to manage Montana's fish and wildlife. Something has to give.

One solution is to further cut programs and services. We have already begun that by reducing staff, travel, shooting range grants, and whirling disease research. Since 2013 we've cut our operating budget by $1.2 million per year. To maintain a balanced budget, we'd need to cut another $2 to $3 million annually. Among other ramifications, that could mean more conservative hunting seasons, less fish stocking, reduced weed control on FWP lands, and a decrease in game law enforcement.

Another option is for the 2015 legislature to free up funds currently earmarked for programs such as Habitat Montana, Block Management, and Upland Game Bird Enhancement for use in other programs.

A third way to bridge the funding gap is for lawmakers to raise hunting and fishing license fees. Or there could be some combination of all three options: cut programs, redirect existing funding, and increase resident license fees.

Starting in July 2013 a citizen advisory council, coordinating with a legislative interim committee, evaluated Montana's fish and wildlife management funding and whether the existing system, which increases license fees every 10 years or so, could be improved. Among other tasks, the 13-member council also looked at the economic loss to FWP of Montana's many free and discounted licenses, tried to simplify Montana's increasingly complex hunting and fishing licensing system, and compared Montana's resident hunting and fishing license fees to those in surrounding states.

In April the council made its final recommendations. Over the next few months, the public may review and comment on the recommendations by way of statewide FWP-sponsored meetings, hunting and angling groups, service clubs, FWP's regional citizen's advisory committees, and the department's website.

Montana's fish and wildlife management is at a crossroads. At stake are the state's hunting and fishing opportunities, outdoors heritage, and reputation as a scenic and wildlife-rich tourism destination.

Whether and how to sustain the fish and wildlife that support those aspects of Montana's high quality of life is not FWP's decision to make. The people of Montana, through their comments and elected representatives in the legislature, will ultimately decide.

—**M. Jeff Hagener,** *Montana Fish, Wildlife & Parks Director*

Note: I received many comments, both pro and con, on my director's message in the March-April 2014 issue regarding relations between hunters and landowners. There was no intent to assign blame to any particular group. My main point was that more cooperation is needed among everyone involved in the issue of public hunting access to private land. ■

DENVER BRYAN

JESSE LEE VARNADO

FISH WRANGLER

JEFF REMUS
Fisheries Technician, Glasgow

"**We do long-term gill net** monitoring at 100 standardized sites throughout Fort Peck each summer. Here I'm on the Upper Missouri Arm. We'd set the nets the previous day, and this was the next morning when we were checking our catch. We weigh and measure each fish and, with some, we'll also age or sex the fish and check stomach contents. The point of the surveys is to track species diversity and see which species are doing well and which aren't from year to year. In this area of Fort Peck, we catch walleye, sauger, northern pike, yellow perch, smallmouth bass, bigmouth buffalo, smallmouth buffalo, goldeye, shorthead redhorse, and both white and black crappie. The 9.5-pound channel catfish I'm holding here is a big one. These are great fish to eat, but for some reason not many anglers target them. The most popular fish here are northern pike, walleye, and smallmouth bass. Fishing for those species has been great these past two years, due to the high water we got back in 2011. Anglers have been catching 10-pound pike all winter, and there are tons of 2- to 4-pound walleye in the lake, too. If you have never fished Fort Peck before, this is definitely the year to do it."

Federal research scientist and freelance photographer **KURT REINHART**, of Miles City, spied this blooming tufted evening primrose one weekend in May at the USDA's nearby Fort Keogh Livestock and Range Research Laboratory. "Because it's so dry, we don't get many wildflowers out here, so these flowering forbs really stand out," he says. To frame the shot, Reinhart dropped his tripod as low to the ground as it would go. "I also used a wide-angle lens so that you see the main focal point, the flower. The landscape features in the background add visual interest," he says.

5

Number of spines on the dorsal fin of a brook stickleback, a tiny native Montana fish related to ocean-dwelling seahorses.

Snowpack looks great

Good news for anglers: As of late April, snowpack throughout western Montana remained well above average. That could lead to above-average runoff and steady flows all season long, says Scott Opitz, FWP fisheries biologist in Livingston. "If we get normal floods in June, then the flows clean silt from river and stream beds and redistribute gravel. That makes for better aquatic insect productivity and fish egg survival," he says. "Then, ideally, the snowpack slowly melts all summer and keeps streams cool and flows from dropping too low. What we don't want is that combination of high temperatures and rain in May, which can bring the water out too early."

Snowpack is not measured in depth but rather as the amount of liquid water in the snow ("snow water equivalent"). The latest percentages, compared against long-term averages, from major basins (as this issue went to press):

Kootenai River:	121%
Missouri River:	151%
Upper Yellowstone River:	154%
Flathead River:	132%
Madison River:	128%
Gallatin River:	143%

A freshwater drum hooked in the lower jaw with a jig in the Yellowstone River near Terry.

FISHING

Fishing for thunder-pumpers

Anglers on the Missouri River from Great Falls to the North Dakota border and on the Yellowstone River downstream of Billings often puzzle over catching a silver-sided, white-lipped fish that looks like some sort of sucker.

In fact it's a freshwater drum, one of the most biologically interesting native species that swims in Montana waters.

Also known as a sheepshead, the fish is the only freshwater member of the drum family, which includes the ocean-dwelling redfish (famously served "blackened" in New Orleans). This silver, bass-shaped fish with the long, sloping forehead is known to scientists as *Aplodinotus grunniens* (*Aplodinotus* from a Greek word meaning "single back," referring to the fish's unbroken dorsal fin, and *grunniens* from a Latin word meaning "grunting"). In southern states, drum are known as croakers and thunder-pumpers, in reference to the male's ability to grunt by vibrating a unique set of muscles and tendons against its balloonlike swim bladder. Sometimes audible to anglers above water, the sound is made in spring during breeding season, probably to attract female drum from a distance.

Among the drum's other extraordinary features:

- A lateral line extending to the end of the tail, rather than just to the base, as on other fish. This allows the drum to pick up extra vibrations and better locate food and enemies.
- An oversized otolith. This white half-sphere of rock-hard calcium, found in the inner ear of all vertebrates, is especially large in freshwater drum. Smooth on one side, rough on the other, the otolith floats on cilia and helps the fish stay balanced and oriented in murky water.
- Pharyngeal teeth. The heavy molars in the fish's throat are used to crush small clams and mussels.
- Eggs that float on the water surface until they hatch, sometimes traveling for miles on rivers before the tiny fry emerge. The uniquely buoyant eggs are likely why the drum has the greatest range—from central Canada to Mexico's Yucatan Peninsula—of any native fish in North America.

In addition, drum possess bone-free fillets that make for great eating.

Though the average drum runs about 14 inches and weighs roughly 1 pound, the fish can grow large in Montana. The state record is a 21.59-pounder caught in 2003 in upper Fort Peck Lake. ■

Commonly mistaken for mosquitoes, nonbiting midges are found throughout Montana and are an important food for trout. Males are easily identified by their featherlike antennae. During hatches, you'll see great cloudlike swarms of midges over rivers and lakes. One member of the nonbiting midge family, *Belgica antarctica*, occurs only in Antarctica and is that continent's largest purely terrestrial animal.

CLOCKWISE FROM TOP LEFT: ILLUSTRATION BY MIKE MORAN; NATHAN COOPER; SHUTTERSTOCK; MACNEIL LYONS; AMERICAN BIRD CONSERVANCY; PUBLIC DOMAIN; SHUTTERSTOCK

STREAM ACCESS

State Supreme Court again rules in favor of stream access

A ruling by the Montana Supreme Court in January 2014 upheld the state's stream access law, notably the right to access streams from bridges on county roads. In Public Lands v. Madison County, the high court ruled that a landowner could not block anglers and others from accessing the Ruby River at three bridges used by the public for decades. The court also ruled that state law allowing public access from bridges did not constitute a compensable "taking" of private property. The ruling noted that Montana's constitution provides that, "All surface, underground, flood, and atmospheric waters within the boundaries of the state are the property of the state for the use of its people and are subject to appropriation for beneficial uses as provided by law."

The ruling is being hailed by public access advocates as "a victory for all Montanans and all who enjoy our public waters," says John Gibson, president of the Public Land/Water Access Association. Critics say the decision sends "a clear signal to other private landowners that investing in fish or wildlife habitat risks inviting strangers into their backyards," write Reed Watson and Terry Anderson on the Property and Environment Research Center's website. ■

CONSERVATION

Capping pipes saves birds

Homeowners, ranchers, mining claimants, and others can prevent cavity-nesting birds from dying a grisly death by capping or screening open PVC, metal, and other pipes. According to the American Bird Conservancy (ABC) and the National Audubon Society, bluebirds, flycatchers, kestrels, sparrows, meadowlarks, woodpeckers, and other species often mistake pipe openings as hollow areas for roosting or nesting. Once inside, they become trapped because the inner walls are too smooth to climb and too narrow for wing expansion.

"The birds die of dehydration or starvation because there's no way out," says Steve Hoffman, executive director of Montana Audubon.

Across the West, more than 45 bird species have been documented as trapped in pipes. Most inspected pipes contained just a few dead birds, though one 6-inch-diameter irrigation standpipe held the remains of more than 200 birds.

Pipes used for fence posts, roof venting, road signage, and building construction can all trap birds. PVC pipes are commonly used to mark mining claims on federal lands. Recently the Bureau of Land Management and U.S. Forest Service began working with Audubon and the ABC to raise awareness of the hazardous markers. The BLM has begun asking mining claimants to replace or cap all open-pipe markers on active mining claims or sites. BLM officials recommend bird-safe markers such as stone mounds, 4-inch-by-4-inch wooden posts, or metal pipes fitted with permanent caps.

Dan Casey, ABC Northern Rockies conservation officer in Bigfork, says anyone concerned about bird entrapment should remove abandoned pipes on their property and fill others with sand or gravel, or permanently seal them with concrete. "This isn't a problem most Montanans are aware of, but we're urging people to check their homes, yards, and ranches and remove any unused pipes and cap or screen those still in use." ■

Dead birds removed from PVC mining claim pipes in Nevada

Wolves stable

Montana's verified wolf population remained stable last year while livestock depredations by wolves continued to decline. A total of 627 wolves were counted in Montana at the end of 2013, compared to 625 the year before. Livestock depredations, declining since 2009, fell by 27 percent from 2012. "We are very much encouraged to see the decline in confirmed wolf depredations on livestock," says Jeff Hagener, FWP director. "That's been one of our top priorities, and I think we're making real headway." Other numbers:

230
Combined hunting and trapping harvest for the 2013-14 season

22,169
Resident hunting licenses sold

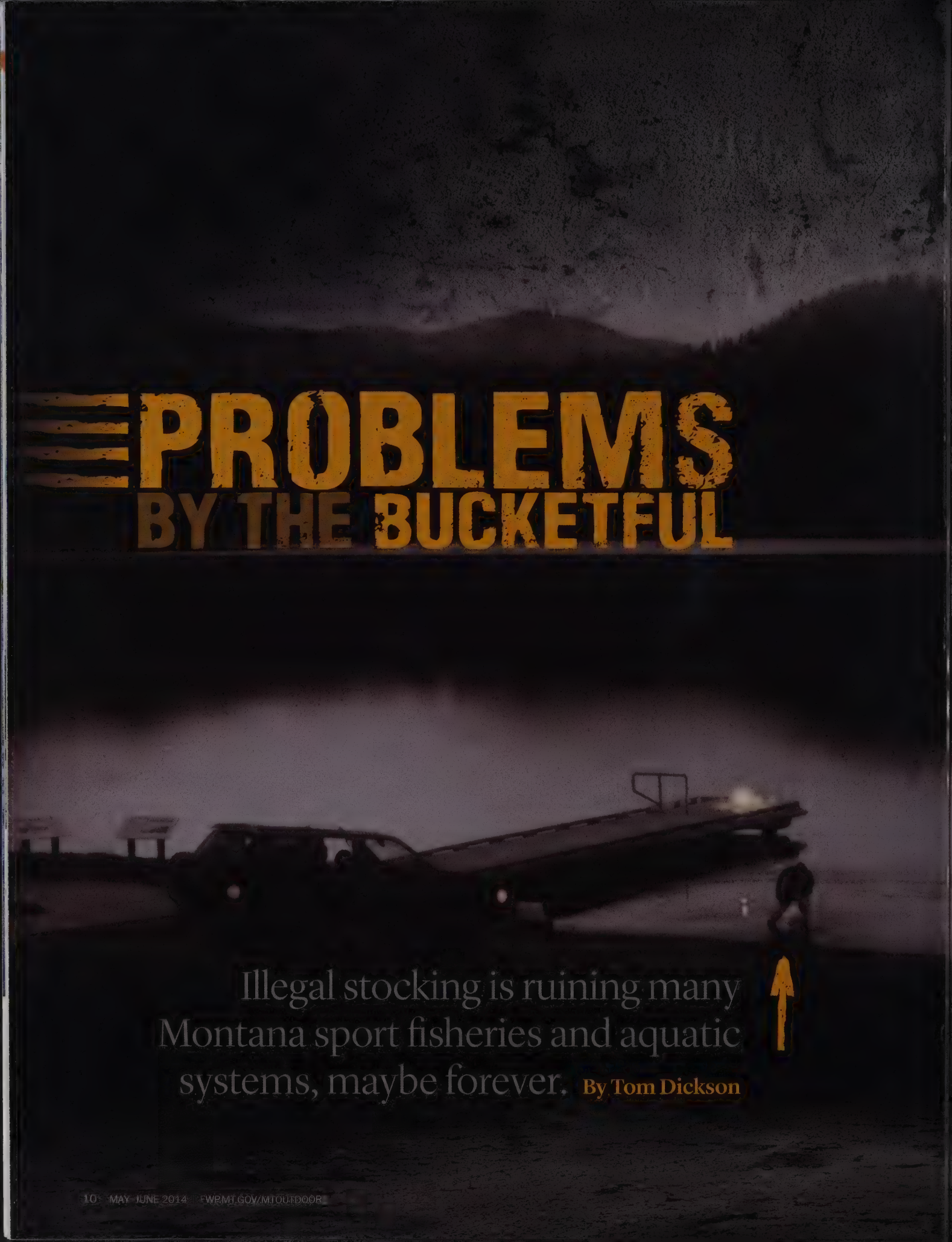
2,310
Nonresident hunting licenses sold

75
Wolves removed by federal wildlife agents and private landowners in response to attacks on domestic livestock (this number is in addition to the hunting and trapping harvest)

255
Combined hunting and trapping harvest for 2012-13 season

625
Minimum wolf count (the number verified by FWP wolf specialists) for the end of 2012

627
Minimum wolf count (the number verified by FWP wolf specialists) for the end of 2013.



PROBLEMS BY THE BUCKETFUL

Illegal stocking is ruining many Montana sport fisheries and aquatic systems, maybe forever. By Tom Dickson

PHOTO ILLUSTRATION BY LUKE DURAN/*MONTANA OUTDOORS*

Ordinarily Pat Saffel likes hearing about anglers catching fish. Not this time. Last September, when the Montana Fish, Wildlife & Parks regional fisheries manager in Missoula saw a photo of an angler with a smallmouth bass recently caught in Seeley Lake, his heart sank. "This was the last thing we needed," he says.

The aggressive non-native smallmouth bass can thrive in Seeley's cool waters and compete with and eat kokanee, native westslope cutthroat trout, and federally threatened bull trout, Saffel says. Seeley is part of the Clearwater Valley Chain of Lakes, which includes Seeley, Salmon, Inez, Alva, and Rainy. Those waters already contain popular game fish populations as well as the protected species that FWP and others have been working for years to restore. "The addition of another predator fish could really mess things up," Saffel says.

The Seeley discovery was just the latest in a string of unlawful fish plantings that are damaging fisheries across Montana. FWP has documented more than 500 illegal introductions in state lakes, reservoirs, ponds, and rivers since the 1980s. All were done without public or biological review of possible harm to existing fisheries and angling opportunities. Though the prohibited activity is statewide, most occurs west of the Continental Divide. Northern pike are most often transplanted unlawfully, with yellow perch a close second. Other species entering public waters through what's known as "bucket biology" are crappies, walleye, smallmouth and largemouth bass, and trout.

Tom Dickson is editor of Montana Outdoors.

The lawbreakers are anglers who insist on new fishing opportunities close to home, say FWP officials. Though western Montana's geology, climate, and tradition generally favor coldwater trout species, a minority of anglers illegally plant warm- and coolwater fish better suited to more temperate and fertile parts of the United States. The lawless activities—condemned by the state's major fishing organizations—threaten native fish populations valued for their natural heritage, as well as federally threatened species. Just as troublesome, illicit fish stocking robs other anglers of existing recreation and, after FWP is forced to clean up the mess, sticks all anglers with the bill.

MY FISH, NOT YOURS

The appeal of illegally stocked fish varies by species. Bass and pike hit lures and flies with abandon and fight wildly when hooked. Perch, walleye, crappie, and sunfish are prized for their tasty fillets. All those fish exist within Montana, particularly in the state's eastern two-thirds. "It's understandable why some anglers would want more of these species in western Montana," says Mark Deleray, FWP fisheries biologist in Kalispell. "But unlawful stocking usually ends up ruining the fisheries already there."

For instance, illegally introduced northern pike have spoiled a once-popular largemouth bass fishery on the Thompson Chain of Lakes, says Mike Henseler, FWP fisheries biologist in Libby. On the Upper and Lower Stillwater Lakes northwest of Whitefish, pike are likely to blame for declines in once-healthy westslope cutthroat trout and bull trout populations.

Another example is Rogers Lake, 22 miles southwest of Kalispell, traditionally a popular arctic grayling fishery. "Then someone sneaked in some perch and, within a few years, they'd completely wiped out the grayling," Deleray says. Perch reproduce so rapidly they often out-eat competing game fish and then stop growing for lack of food. "So Rogers went from a real popular fishing lake to one with very little worth catching," Deleray says.

The Seeley-Swan Valley has been especially hard hit, says Ladd Knotek, FWP fisheries biologist in Missoula. During the early 1990s, northern pike were illegally stocked into several lakes (including Salmon and Seeley Lakes), damaging existing trout fisheries. The pike have since spread downstream into the Blackfoot and Clark Fork Rivers, where they feed on those waters' brown, rainbow, and cutthroat trout. In addition, illegally introduced brook trout have damaged one of Montana's best westslope cutthroat fisheries—Clearwater Lake—at the head of the Clearwater River drainage.

New introductions often provide a ready source for even more unlawful introductions. "Once we start seeing pike, perch, or crappie in one lake, they start showing up in nearby waters," says Deleray. "And a lot of these aquatic systems are interconnected, allowing

"NOW THOSE JUVENILE TROUT ALSO HAVE TO GO THROUGH A GAUNTLET OF WALLEYE IN ADDITION TO THE BASS AND NORTHERN PIKE ALREADY THERE."

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invasive fish to spread naturally for miles to other waters."

Concern over the illicit activity is widespread. Montana Trout Unlimited, Walleyes Unlimited of Montana, Montana B.A.S.S. Nation, and the Montana Wildlife Federation have publicly denounced unlawful fish planting. "We are totally against illegal stocking and totally for FWP efforts to stop it in its tracks," says John Kelly, president of Walleyes Unlimited of Montana. Bruce Farling, executive director of Montana Trout Unlimited, calls illegal stocking a "completely selfish act by a few people putting everyone else's recreation at risk just to satisfy their own desire."

UNWELCOME NEWCOMER
The smallmouth bass (above), a non-native species that recently appeared in Seeley Lake, poses a threat to the lake's westslope cutthroat trout and federally threatened bull trout fisheries. Rainbow trout (right) and other salmonids are the main casualties of illegal introductions, though popular largemouth bass and walleye fisheries are also at risk.

NOXON'S NEW WALLEYE

One of Montana's most notorious illegal introductions took place at Noxon Rapids Reservoir. In 1991, walleye were discovered in the 8,000-acre impoundment of the Clark Fork River, which extends along Montana Highway 200 near the Idaho border. The fish likely arrived from several unauthorized introduction attempts in the late 1980s, says Kenny Breidinger, local FWP fisheries biologist. By 2000 annual survey nets showed that walleye were established and reproducing. Though numbers remain low compared to other Montana reservoirs containing walleye, the population continues to grow.

"Here is a lake that has excellent smallmouth and largemouth bass fisheries, is home of the largemouth state record [8.8 pounds], has winter perch fishing, and shows stable populations of westslope cutthroat trout and bull trout," Breidinger says. "We have the whole package—sport fish, food fish, native fish, and a federally threatened fish—all doing well. And now that delicate balance is threatened by walleye."

Breidinger says the addition of another predator species has already caused significant declines in forage fish such as native peamouth, pikeminnow, and suckers. Numbers of perch—a preferred walleye food—also are dropping. "The thing about walleye is they reproduce fast, so they can produce a lot of new mouths to feed in a very short time," Breidinger says.

The potential damage to Noxon's federally threatened bull trout is especially worrisome. Throughout much of the year, walleye congregate at several tributary mouths, where young bull trout enter the reservoir from upstream rearing waters. "Now those juvenile trout also have to go through a gauntlet of walleye in addition to the bass and northern pike already there," says Breidinger.

TOO MANY MOUTHS TO FEED

Adding a new fish species to a big lake may seem like a good idea. After all, with all that water, won't the new fish just "fit in?" Unfortunately, no, say biologists. Cold and high in elevation, most western Montana lakes and rivers contain far fewer nutrients, aquatic insects, and prey fish than waters in states to the east and south. Adding new fish takes food away from existing ones. "It's like having cows in a pasture, where everything is fine but then you add sheep, then llamas, then other grazers," says Breidinger. "Pretty soon there are too many mouths to feed, not enough grass, and all the animals are going hungry."

Adds Curtis Spindler, president of Montana B.A.S.S. Nation, "A lot of people don't understand that our lakes have already reached a natural balance between predator and prey. You add a new predator species and that can really do some damage."

New forage species can do the same, sometimes harming the game fish they are meant to benefit. "We get a lot of anglers asking us to stock new prey fish such as cisco or

FROM TOP: ROBERT S. MICHELSON; JONNY ARMSTRONG/USGS

rainbow smelt to help walleye," says Don Skaar, chief of FWP's Fish Management Bureau in Helena. "Unfortunately, some forage fish end up competing with walleye fry for zooplankton, which can lead to poorer growth and survival of young walleye."

Prohibited stocking can also erase expensive and time-consuming work to conserve and restore native and federally threatened species. "FWP, landowners, and conservation groups like ours have spent years and millions of dollars restoring and improving westslope cutthroat trout and bull trout fisheries in the lakes, tributaries, and rivers connected to Seeley Lake," says Farling. "The disturbing new illegal introduction of smallmouth bass threatens all of that."

Another strike against illicit fish plants is the high cost of removing the unwanted newcomers. "Rehabbing" requires using specialized toxicants to eliminate all fish in the tainted water and then restocking desired species. Costs, paid for with fishing license dollars, run $15,000 to $20,000 for smaller lakes and over $50,000 for larger ones. "That's time and money we could otherwise be spending on improving habitat and managing fish elsewhere," says Bruce Rich, head of the FWP Fisheries Division.

Rehabilitation costs could potentially skyrocket. Across Montana's border in Yellowstone National Park, an illegal introduction of lake trout decimated Yellowstone Lake's pure-strain Yellowstone cutthroat trout population. On one tributary, historically used by bald eagles and grizzly bears to feed on spawning trout, cutthroat numbers went from 2,363 in 1999 to just 1 in 2004. The current tab to remove the lake's unwanted lake trout, which first showed up in 1994, runs roughly $2 million per year. "That indicates what kind of costs we could be facing here in Montana from a particularly harmful illegal introduction," says Rich.

And that's if the damage can even be fixed. In many cases, harm is irreparable. "This is not like vandalizing a sign," says Knotek. "These people are ruining entire fisheries and aquatic systems, maybe forever. The public loss is huge."

Ironically, in most cases illegally stocked fish don't even produce the desired effect. Deleray says that in the 56 waters where FWP has recorded perch in northwestern Montana, "only a handful" produce fish worth keeping. "Perch in most lakes have stunted out at 5 to 8 inches, too small to interest most anglers," he says.

The same holds true with northern pike, native within Montana only to a tiny watershed east of Glacier National Park but now found in 50 waters west of the divide. In many lakes and backwaters, such as the Clearwater system, the predator so overwhelms existing fisheries that it eats itself out of house and home. Often all that remain are countless 18-inch "hammer handles" producing skinny, bony fillets and little sporting value.

NOT ANOTHER ONE! In most cases, predator and prey species have already reached a natural balance in Montana's lakes and rivers. "You add a new predator species, and that can really do some damage," says the head of one statewide fishing organization.

BACKFIRE In most cases, illegally stocked fish don't even produce the desired results. The new species quickly eat up available stocks of bait fish (above, being identified by FWP crews) and end up stunting (right, undersized walleye). For instance, in the 56 waters where FWP has recorded illegal perch introductions in northwestern Montana, only a few produce perch of a size that most anglers want to catch and keep.

Ultimately, says Rich, unlawful fish introductions are unfair and undemocratic activities in which a handful of anglers ruin the recreation of others. "How would you like it if some people went out to your favorite lake or river and wrecked it by putting the fish *they* wanted in there?" he says.

CONCERTED RESPONSE

Montana has begun taking illegal fish stocking seriously. The 1997 Montana Legislature increased the fine to $5,000 and tacked on potential for jail time. In 2011, lawmakers doubled the fine to $10,000.

Recently FWP proposed a new rule that beefs up the department's response to confirmed reports of illegal introductions. FWP held public meetings this past winter across Montana to gather input on the proposal. The new rule would commit FWP to launching, within 30 days of a credible report, investigations that confirm the presence and distribution of the new species (currently there is no response deadline). The department would then draw up an action plan for responding to and potentially suppressing or even removing the unwanted species (currently no plan is required). Possible actions include using nets or even chemicals for removal, or closing the infested water to all fishing to remove incentives for future illicit stocking.

The biggest unmet challenge remains actually nabbing lawbreakers. "It's very important to catch someone in the act," says Jim Kropp, head of the FWP Enforcement Division. "That's why we're enlisting the help of anglers and angling groups—the very people who have the most to lose." The state's main walleye and trout organizations offer rewards for tips on illegal introductions leading to convictions. FWP is working with these and other angling groups to form a coalition that will provide additional reward money.

"THIS IS NOT LIKE VANDALIZING A SIGN. THESE PEOPLE ARE RUINING ENTIRE FISHERIES AND AQUATIC SYSTEMS, MAYBE FOREVER."

At Seeley, FWP plans to look for smallmouth this spring, capture and tag adults, follow them to spawning sites, then target concentrations of the unwanted species to remove as many as possible with netting and electrofishing. "We have very little time to prevent an introduction from establishing itself," says Saffel. "We have to find the fish when there still aren't very many—a Catch 22—and then remove them. This means aggressive action early. I think we definitely have a shot at eliminating smallmouth before they get established."

At Noxon, the department is working on a revised environmental assessment of a study that, if undertaken, would examine the feasibility and cost effectiveness of suppressing walleye in the reservoir. FWP plans to have the new assessment available for public review next winter and decide by spring 2015 whether to do the project.

"What you're seeing with the increased fines, the proposed Noxon study, the new FWP rule, and the reward coalition is a concerted effort by our agency and Montana's angling community to stop this threat," says Rich. "Illegal fish stocking can do irreversible harm to the state's public resources, and we can't tolerate it any longer."

CLOCKWISE FROM LEFT: ILLUSTRATION BY ED JENNE; JESSE LEE VARNADO; SHUTTERSTOCK

Bird Calls

A new online checklist program turns recreational birders into global "biological sensors." By Jim Robbins

On a warm morning not long ago on the shore of a small prairie lake outside Montana's state capital, Bob Martinka trained his spotting scope on a towering cottonwood tree heavy with blue heron nests. He counted a dozen of the tall, graceful birds and got out his smartphone, not to make a call but to type the number of birds and the species into an app that sent the information to researchers in New York.

Martinka, a retired Montana Fish, Wildlife & Parks biologist and an avid bird watcher, is part of the global ornithological network eBird. Several times a week he heads into the mountains to scan lakes, grasslands, even the local dump, and then reports his sightings to the Cornell Lab of Ornithology, a nonprofit organization based at Cornell University.

"I see rare gulls at the dump quite frequently," Martinka says, scanning a giant mound of bird-covered trash.

Tens of thousands of birders are now what the lab calls "biological sensors," turning their sightings into digital data by reporting where, when, and how many of which species they see. Martinka's sighting of a dozen herons is a tiny bit of information, but such bits, gathered in the millions, provide scientists with a very big picture: perhaps the first crowd-sourced, real-time view of bird populations around the world.

Birds are notoriously hard to count. While stationary sensors can measure things like carbon dioxide levels and highway traffic, it takes people to note the type and number of birds in an area. Until the advent of eBird, which began collecting daily global data in 2002, so-called one-day tallies were the only method.

While counts like the Audubon Christmas Bird Count and the Breeding Bird Survey bring a lot of people together on one day to make bird observations across the country, and are scientifically valuable, they are different because they don't provide year-round data.

And eBird's daily view of bird movements has yielded a vast increase in data—and a revelation for scientists. The most informative product is what scientists call a "heat map": a striking image of the bird sightings represented in various shades of orange according to their density, moving through space and time across black maps. Now, more than 300 species have a heat map of their own.

"As soon as the heat maps began to come out, everybody recognized this is a game changer in how we look at animal populations and their movement," says John W. Fitzpatrick, director of the Cornell Lab. "Really captivating imagery teaches us more effectively."

It was long believed, for example, that the United States had just one population of orchard orioles. Heat maps showed that the sightings were separated by a gap, which

Follow that bird
Annual occurrence of lazuli buntings migrating north into the Lower 48 during 2013 from eBird reports. In varying shades of orange, the "heat maps" shows how densities varied during a six-month period.
April 18
June 21
August 2

means there are not one but two genetically distinct populations.

Moreover, the network offers a powerful way to capture data that was lost in the old days. "People for generations have been accumulating an enormous amount of information about where birds are and have been," Fitzpatrick says. "Then it got burned when they died."

No longer: eBird has compiled 141 million reports, or bits, and the number is increasing by 40 percent a year. In May 2013, eBird gathered a record 5.6 million new observations from 169 countries. Martinka's sighting of 12 herons at once, for example, is considered one species observation, or bit.

The system also offers incentives for birders to stay involved, with apps that enable them to keep their life lists (records of the species they have seen), compare their sightings with those of friends (and rivals), and know where to look for birds they haven't seen before.

"When you get off the plane and turn your phone on," Fitzpatrick says, "you can find out what has been seen near you over the last seven days and ask it to filter out the birds you haven't seen yet, so with a quick look you can add to your life list."

The system is not without problems. Citizen scientists may not be as precise in reporting data as experienced researchers are, like the ones in the Breeding Bird Survey. Cornell has tried to solve that problem by hiring top birders to travel around the world to train people in methodology. And 500 volunteer experts read the eBird submissions for accuracy, rejecting about 2 percent. Rare-bird sightings get special scrutiny.

The engine that makes eBird data usable is machine learning, or artificial intelligence—a combination of software and hardware that sorts through disparities, gaps, and flaws in data collection, improving as it goes along.

"Machine learning says, 'I know this data is sloppy, but fortunately there's a lot of it,' " Fitzpatrick says. "It takes chunks of this data and sorts through it to find patterns in the noise. These programs are learning as they go, testing and refining and getting better and better."

Still, some experts question eBird's validity. John Sauer, a wildlife biologist with the U.S. Geological Survey, says that bird watchers' reports lack scientific rigor. Rather than randomness, he says, "you get a lot of observations from where people like to go." And he doubts that Cornell has proved the reliability of its machine learning efforts.

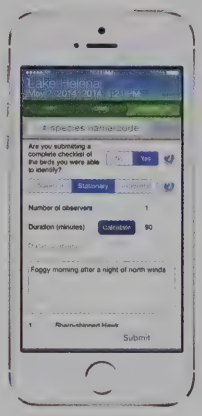
Still, the information has promise, he says, "and it's played a powerful role in coordinating birders for recording observations, and encouraging bird watching."

And the data is being used by a wide array of researchers and conservationists.

Cagan H. Sekercioglu, a professor of ornithology at the University of Utah who has used similar bird watching data in his native Turkey to study the effects of climate change on birds, calls eBird "a phenomenal resource." He says it was "getting young people involved in natural history, which might seem slow and old-fashioned in the age of instant online gratification."

Data about bird populations can help scientists understand other changes in the natural world and be a marker for the health of overall biodiversity. "Birds are great indicators because they occur in all environments," says Steve Kelling, director of information science at the Cornell bird lab.

> "It's a really neat tool. If you see one bird or a thousand, it's significant."



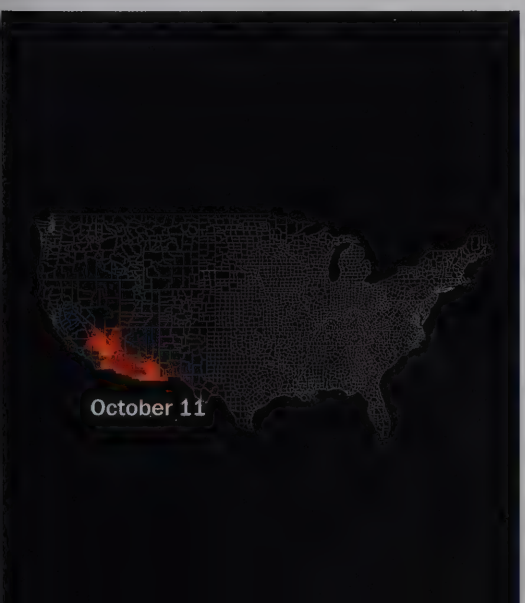
A decline in eastern meadowlarks in part of New York State, for example, suggests that their habitat is shrinking—bad news for other species that depend on the same habitat. In California, eBird data is being used by some planners to decide where cities and towns should steer development.

The data is also being combined with radar and weather data by BirdCast, another Cornell bird lab project that forecasts migration patterns with the aim of protecting birds as they move through a gauntlet of threats. "We can predict migration events that would be usable for the timing of wind generation facilities to be turned off at night," Fitzpatrick says.

In California, biologists use the migration data to track waterfowl at critical times. When the ducks are headed through the Central Valley, for example, biologists can ask rice farmers to flood their fields to create an improvised wetland habitat before the birds arrive. "The resolution is at such a level of detail they can make estimates of where species occur almost at a field-by-field level," Kelling says.

The data from eBird has been used in Britain, too, combined with that of a similar program called BirdTrack, which uses radar images, weather models, and even data from microphones on top of buildings to record the sounds of migrating birds at night.

And for bird watchers, the eBird project has given their pastime a new sense of purpose. "It's a really neat tool," Martinka says. "If you see one bird or a thousand, it's significant."



INFOGRAPHIC: LUKE DURAN/MONTANA OUTDOORS. SOURCE: EBIRD.COM

Jim Robbins is a freelance journalist in Helena. A version of this article originally appeared in The New York Times. *Used with permission.*

CRACKING THE

"I'll bet those guys are from the Midwest," said Mary. "Look how small their nets are. And I hope they have enough backing on their reels." My wife and I were walking along a Missouri River side channel near Craig, watching several anglers work a pod of forearm-length rainbows.

It was the peak of the July caddis explosion, and hordes of bugs hovered above the water and bankside willows. The caddis galaxies, mixed with scattered Pale Morning Dun (PMD) mayflies, had stoked a feeding frenzy. The guys with the tiny landing nets—who we later learned *were* Midwesterners—worked the hungry pod to no avail. They couldn't hook a single trout and were obviously frustrated. Thinking back on my own history of learning how to fish the Missouri and Montana's other big trout rivers, I knew exactly how they felt.

At least those anglers had located fish—which is more than I could say for myself during many initial visits to the state's sprawling rivers.

One of the best life decisions my wife and I made was to move from Minnesota to

JEWAN SNOW

CODE

Figuring out Montana's massive trout rivers when you're accustomed to fishing small streams. By Jeff Erickson

WHERE TO START? Even on a trout factory like the Missouri River, shown here, only a small amount of water actually holds fish. One approach is to flail away, trying to cover as much water as possible in the hopes of lucking into a fish or two. Far more effective is to learn where fish hold on big water and target those spots. Likely trout water in this scene: the riffle and flats where the angler is fishing, the island's tip and tail, and the streamlike channel between the island and riverbank.

Montana in 1994. Rivers like the Missouri, Bighorn, Yellowstone, and Kootenai offer oversized trout that the Midwest's spring creeks can rarely match. After arriving here, we began to regularly visit the Missouri's fertile stretch between Holter Dam and Cascade. Lacking a drift boat, we walked and waded, having no idea of the vast learning curve ahead of us. We went from fishing small streams that often ran at less than 50 cubic feet per second (cfs) to a tailwater leviathan running at 3,500 to 5,000 cfs during typical midsummer flows. It was like fly-fishing on the Pacific Ocean.

Our first Missouri excursions were humbling busts. I was continually frustrated by the hard-to-read river, its hurricane-force winds, and the selective, uncooperative fish.

But eventually I began cracking the code of the Missouri and other big rivers and started hooking fish. What follows is the insight I've gleaned from two decades of fishing and hundreds of outings. By comparing big Montana rivers to the small creeks back home, I've discovered many similarities but also several essential differences. The trick has been to learn when to fish a big river like

a small stream, and when to fish it with a completely different approach.

BREAK IT DOWN

Remember your first term paper in college? If you were anything like me, you became overwhelmed by the information you had to absorb and then organize into a coherent essay. It took me years (and an embarrassing number of incompletes) to learn how to break a large writing project down into manageable parts that I could tackle piece by piece.

The first time I saw the Missouri, it reminded me of those college research project nightmares. The river was so big, and all the water looked so similar. I was paralyzed, not knowing where to begin.

Eventually I learned that not all water on big rivers holds fish. Instead of being scattered randomly throughout, as I once thought, trout concentrate in key areas. The trick is to find those spots.

As soon as I arrive at a river, I begin surveying the water and surrounding landscape. As I calmly look upstream and downstream, I see that what initially appeared to be a vast and featureless expanse has many definable and fishable characteristics. Yes, I'm still tempted to start casting randomly, eager as usual to get my fly on the water. But I've learned the importance of examining the river beforehand so I don't flail away fruitlessly like in the old days.

Helena resident Jeff Erickson is a freelance writer and the Rocky Mountains field editor for Northwest Fly Fishing.

For anglers accustomed to fishing creeks and streams, side channels are reassuring places to start on any big river.

ISLAND LIFE

Two critical features of any big trout river are its islands and side channels. I focus most of my fishing in these areas and will happily spend an entire day exploring an island complex, flushing deer, geese, and beaver as I wade the shallows looking for fishy water.

Trout love side channels between islands and the main riverbank. The narrow waters provide spawning areas, habitat diversity, and shelter from the powerful main current. For anglers accustomed to fishing creeks and streams, side channels are familiar, reassuring places to start.

Channels often hold big trout. Many anglers from elsewhere assume Montana's trophy browns and rainbows only hunker down in the biggest water, in the middle of the main current where wade anglers can't reach. In fact, trout over 20 inches often hang out in channels the size of small streams.

Island tips and tails are productive places to fish. Trout often lie in current seams on either side of the tail, as well as farther down where the two current lines converge. Immediately below the tail there is often a calm area. There trout can avoid current while feeding on aquatic insects that accumulate during and after a hatch. After sunset, trout also cruise the shallows just off the tail looking for baitfish, making that water a good place to throw streamers.

Upstream tips of islands may not appear to be productive, but they often hold fish. Trout frequently rest in current seams and ripple lines created where channels sweep past the tip. During hatches, gravel flats that often fan out above or below islands can be alive with rises. One July evening, in such a spot on the Missouri, I landed a 19-inch

AWAY FROM THE MAIN When big water—like on the Bighorn River—becomes too overwhelming, anglers learn to key in on side channels. These narrow stretches can be fished just like the streams that many nonresident anglers are used to fishing back home.

BARRY & CATHY BECK; RIVER INFOGRAPHIC BY LUKE DURAN/*MONTANA OUTDOORS*

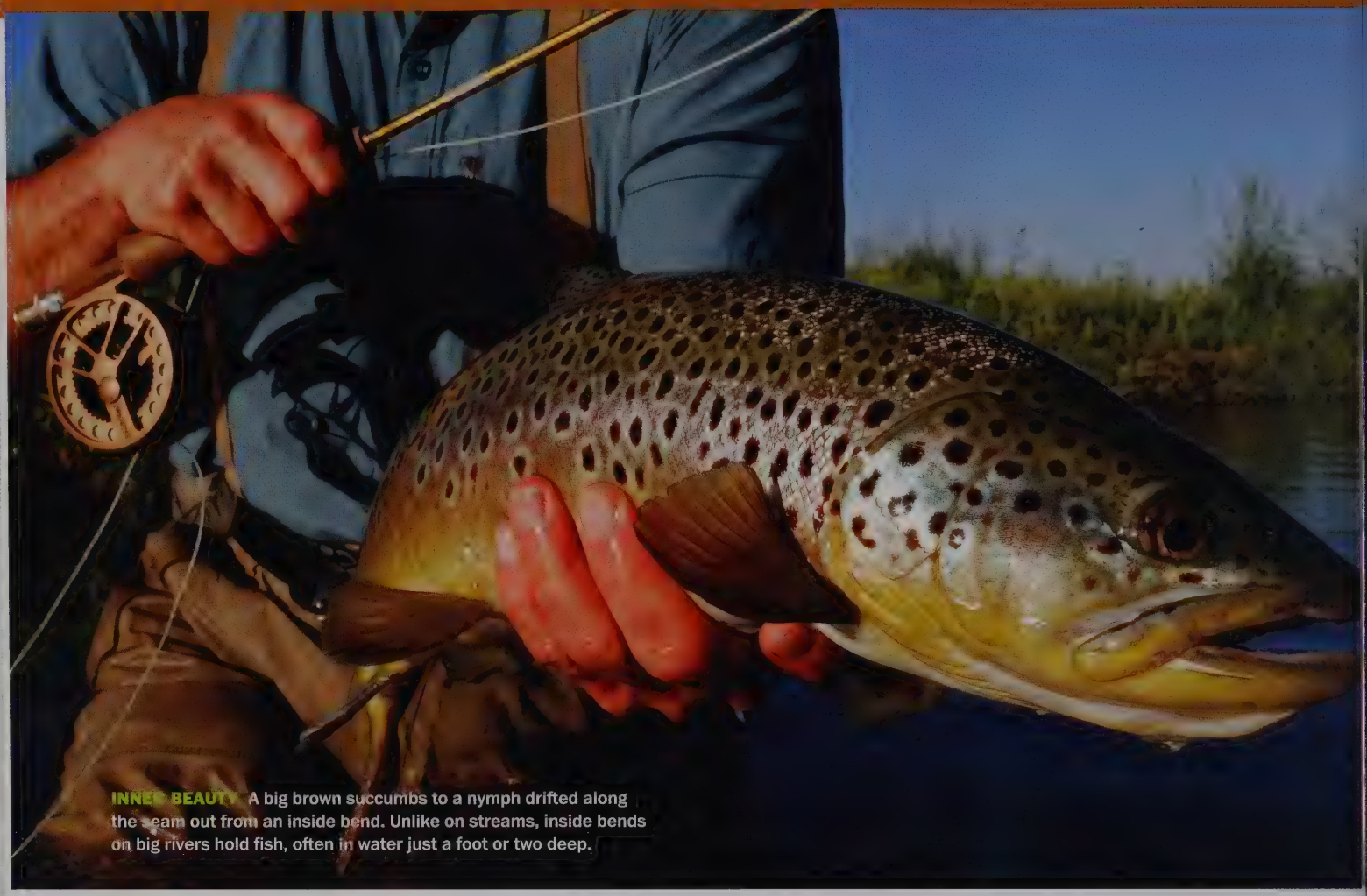
Islands

Anglers intimidated by Montana's big rivers can start by fishing around any islands they can find. The channel between most islands and the main bank acts like a small stream, and anglers should treat it as such. Look for runs, riffles, and shady spots along the shoreline where trout on streams typically hold. Don't let the relatively small size of channels fool you into thinking this is small-fish water. Big trout often hold here. Other productive water includes the seams and calm spots at the tip and tail, and calm, shallow spots along the island banks.

Fishing Islands and Inside Bends

Inside Bends

Inside bends on small streams are usually too shallow and exposed to hold trout. Not so on big rivers. Here fish often cruise in less than a foot of water, able to dash to safety in the main channel. Anglers new to big rivers often make the mistake of not fishing these shallows. In midsummer, when vegetation fills the inner bend, drift nymphs along the seam where the weed beds and main current meet.



INNER BEAUTY A big brown succumbs to a nymph drifted along the seam out from an inside bend. Unlike on streams, inside bends on big rivers hold fish, often in water just a foot or two deep.

brown and then—10 minutes later—hooked and netted an explosive 19-inch rainbow.

Just as the banks of small streams often produce good trout fishing, so do the banks of island channels. Terrestrial insects such as ants and beetles tumble off steep cutaway banks, while floating bugs are driven to bankside shallows by wind and current. Some of the biggest side-channel fish may be holding in just several inches of water, feeding on Blue-Winged Olives, PMDs, Tricos, midges, caddis, or grasshoppers.

Islands also act as windbreaks. When gales strafing the main river put fish down, high side-channel banks create calmer zones where trout often continue rising. Anglers can use these sheltered areas to fire off more accurate casts—and avoid banging the back of their skull with a heavily weighted Woolly Bugger cast in heavy winds.

STICK TO THE SHALLOWS

Outside bends are where big rivers and small streams are worlds apart. On streams, outer bends are smart places to work a fly, especially where current moves through undercut banks or other cover. But on most rivers, the massive volume of water ripping along an outside bend can be too heavy and deep to fish effectively, especially for wading anglers. On a big river like the Yellowstone, you can step off the bank on an outer bend and immediately be in over your head.

> One of the biggest mistakes I see other anglers make is to ignore shallow water.

Inside bends are just the opposite. On small streams, this inner part of the current is often too shallow and lacks enough overhead cover to attract trout. Though the same hydraulic forces shaping inside bends on smaller streams also apply to larger rivers, the fishing opportunities here are far better. Big river trout often rest comfortably in the featureless, shallow slack water of inside bends. There they can avoid battling the main current while still finding plenty to eat, then dash to deeper water to escape danger.

One of the biggest mistakes I see other anglers make on big rivers is to ignore shallow water. I understand the error. In much of the United States, including small streams in Montana, anglers have learned that trout congregate in deep, shaded holes and runs, such as under overhanging trees or out from large limestone outcrops. But on rivers, the biggest fish often hang out in the shallowest spots. Often I've seen anglers standing in 2 feet of water that I know from experience holds big trout, casting out to 20-foot depths where, on many rivers, fewer fish lie.

One way to read shallow water is to stare at it for several minutes or more, without casting. A trout's conventional rise to a dun on the surface will be fairly obvious, but be alert for more subtle signs: a slight ripple, a flash of a fish, a slowly waving fin, a nose bulging the surface, or fleeing minnows. Big river trout are in the shallows because they're hungry and that's where the food is. Look for signs.

Don't make the mistake of leaving shallow water once the sun goes down. The best prospecting often occurs immediately before and after sunset. Once light leaves the

IMAGES ON THE WILDSIDE / MARK JOHNSON; JEREMIE HOLLMAN

water, trout lose caution and are more likely to attack a fly in skinny water. Bring a headlamp and stay for the river's encore.

Seams—places where two currents meet—are another feature that small-water trout anglers should always look for on big rivers. The friction causes the river to slow and give fish places to rest while feeding off the conveyor belt of protein floating past in the swifter current.

Look for seams out toward the main current from bankside shallows. Seams also exist between the shallows of inside bends and the deeper main current. These current lines are especially productive in midsummer on slow, fertile rivers like the Missouri or Bighorn. When inner bends become weedy this time of year, trout hold along the edge of the vegetation.

JUST LIKE HOME

Anglers overwhelmed by a big river's volume should also keep their eyes peeled for the same types of riffles, runs, eddies, and other structure that hold trout in creeks. The difference is that these features on big rivers may be spaced hundreds of yards or farther apart. Or they may morph into each other more subtly than on a faster, smaller stream. While walking 10 minutes along a mountain brook, an angler might encounter a dozen different riffles, runs, and pools. On larger, slower rivers, you may have to hike for half an hour or more just to find one of these familiar fishing features.

Just like on small streams, big river trout gravitate to riffles for abundant insects, enhanced dissolved oxygen, and overhead protection provided by broken water. Like on many trout streams, the zones where riffles drop off into runs are also prime spots to drift a nymph. During a hatch, the entire surface of a long run may be punctuated with rises.

The mouths of tributaries running into large rivers are trout havens, especially during spring and fall spawning seasons. Boulder-strewn pocket water also can be fruitful. The same goes for gravel bar drop-offs, overhanging willows, or submerged logs. If you can't find obvious fish cover, look harder for subtleties: small rocky points creating a ripple line, fences or beaver lodges intercepting the river, or slight depressions in the bottom.

Big river eddies are like a secret nightclub where the action keeps rocking after hours.

Deep holes also hold fish, but while a hole on a stream might be 8 feet deep and fishable, on a river it could go down 30 feet or more, making it impossible to fish without a boat—and difficult even then.

Instead of holes, I look for eddies. Sometimes I'll emerge from those massive whirlpools slathered in weeds, mud, and rotting bugs and holding a football-sized brown for my efforts. With all the debris circling in that purgatory of current, you might think you're fishing for carp in an urban backwater (in fact carp do often hold in Montana's big river eddies). The whirlpool action of an eddy captures and holds vast amounts of insects—along with mats of vegetation, lost bobbers, discarded worm containers, and other unsightly debris. But the trout don't care about this, and neither should you.

Big river eddies are like a secret nightclub where the action keeps rocking long after the party has shut down elsewhere. Trout take up position in an eddy and feed all day—even when there's not a rise anywhere else on the river—and well into the night. One challenge for fly anglers is getting a drag-free drift in the tricky currents, which often go several directions at once. Another is to keep the floating vegetation and other scum off your fly and tippet, usually done with tight, whiplike false casts.

Some of the best times to fish eddies are on cool, damp days, when the wings of *Baetis* and other mayfly duns stay too damp for the insects to readily fly off the surface. The flies are trapped in the circulating current, and trout move in and feed aggressively.

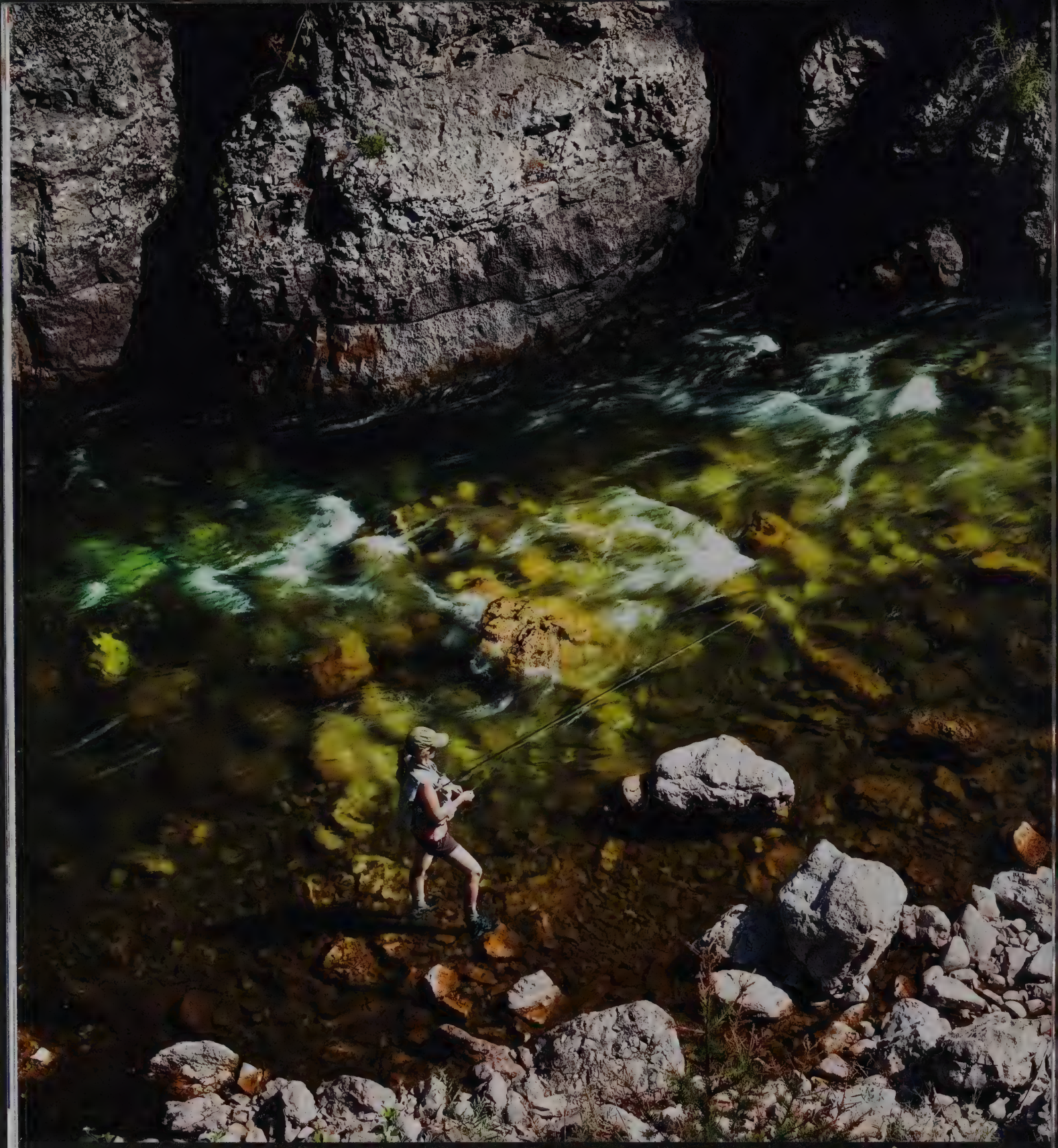
Trout waters big and small share many similarities. That's because trout are always looking for the same things: safety, food, and cold, oxygenated water. The big difference between Montana's oversized rivers and a familiar "crick" is that the fishy features are not nearly as obvious. You have to look harder and cover more ground. But the trout are there.

Big rivers can be a lot like those Bev Doolittle paintings, where the ponies are hidden in the background yet remain in plain sight. When fishing a river, you can stare and stare and see nothing other than miles of uniform, seemingly fishless current flowing past. Then you spot a shadow or slight current undulation that reveals itself as a trout or a place where a trout likely lives. Even more amazing, you realize it's been there all along.

Cross carefully

It's pretty hard to drown while wading a small stream. But that's not the case with Montana's big rivers. The level of danger grows with the water's size and intensity. Sometimes, while wading way off the downstream tip of an island, I remind myself that a fall would quickly put me in the middle of the river, a football field from either bank. When gravel starts ripping loose from under my wading boots, I start heading back upstream to shallower water. One tip when contemplating a dicey crossing is to visualize what would happen if you did fall in and how you would respond. Your safety will be greatly enhanced by wearing a wading belt cinched tightly around your waist, and using a wading staff. If you do get swept into the current, remember to float calmly on your back—feet downstream—until you can work yourself over to shallower water. —JE

GO LOW When wading swift water, bending your knees lowers your center of gravity and keeps you from being swept downstream.



Sweet Surroundings

Trout

Trout are just one reason to linger along streams and rivers. By Tom Dickson

fishing is a legitimate excuse to spend long periods of time in the most beautiful places on earth. Of course anyone can hike along a stream or river to watch birds or take photos. But after a few hours, people might wonder why you're still there. Not so for anglers.

It doesn't seem odd to hang out streamside all day if I have a rod in my hand. People assume I'm waiting for a hatch or figuring out which fly to tie on, when I'm actually drinking in the scenery like any tourist.

To be sure, the fishing itself has great appeal. I like to see a trout inhale my dry fly as much as the next angler. But that doesn't happen nearly as often as I wish it did. Good thing a trout stream has so much more to offer.

The fact is, if we measure days on the water only by the number of trout caught, few of us could justify the effort—to our spouses or ourselves. But if instead an angler gives worth to time spent where watercress grows, cliff swallows skim the water surface, and snow-topped peaks rise beyond sage-covered

BEN PIERCE
Belt Creek in Sluice Boxes State Park

foothills, then the hours have been well expended.

After a day wading the cool, clean waters of a gurgling stream or blue-ribbon river, I always return home relaxed and sated, no matter what took place at the end of my line.

Partly it's the quiet. The angry buzz of motorboats and personal watercraft rarely disturbs Montana's 15,000 miles of fishable trout streams and rivers. Though roads and freeways regularly parallel trout rivers, the trees, wind, and water absorb most of the noise. For anglers standing in or watching the current, the hushed, moving water soothes like a shoulder massage. Add sunlight and a grassy bank for napping, and it's a wonder any fishing gets done at all.

A stream or river ties water and land together. And not just any land. The bank soil wicks water that keeps shoreline vegetation

Clockwise from right:

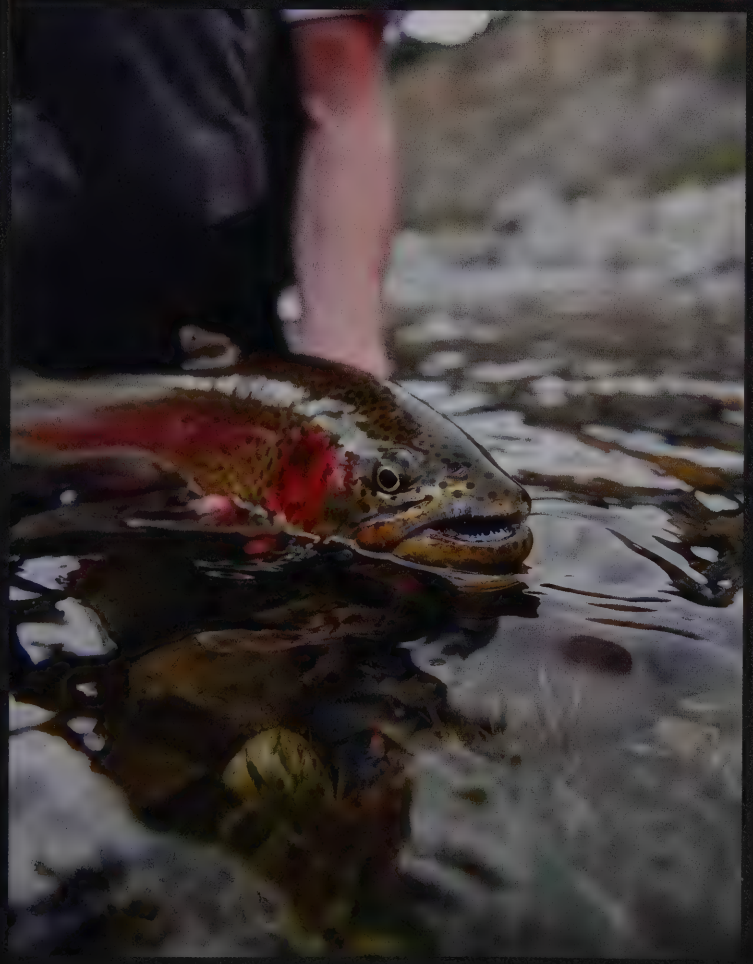
ROWAN NYMAN
Missouri River near Pelican Point

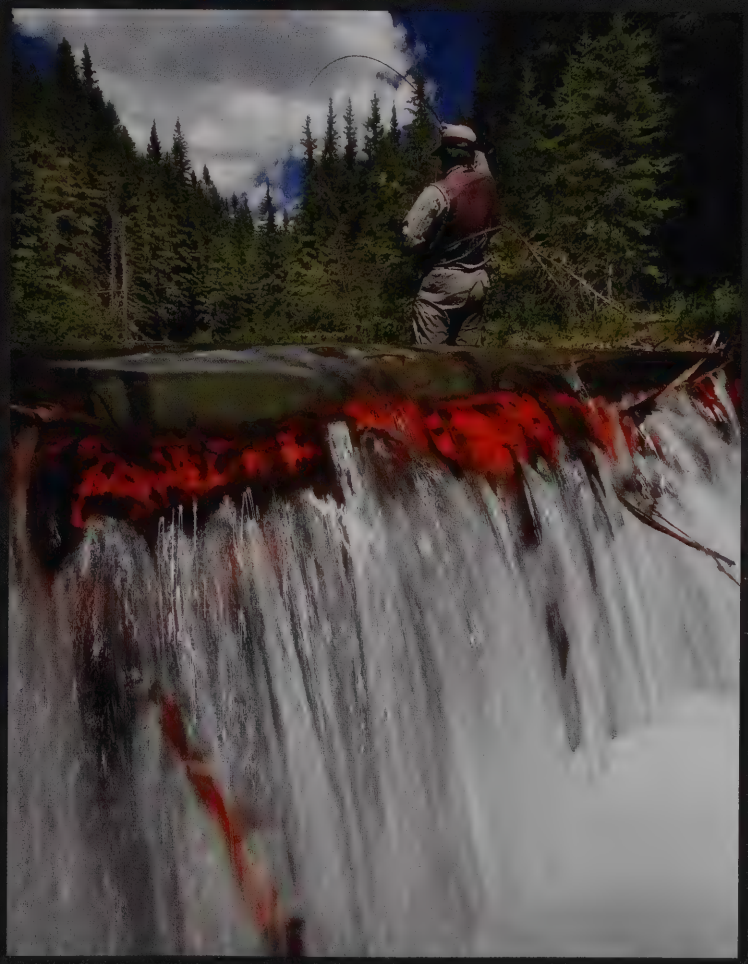
CRAIG & LIZ LARCOM
Cliff swallow mud nests along the Missouri

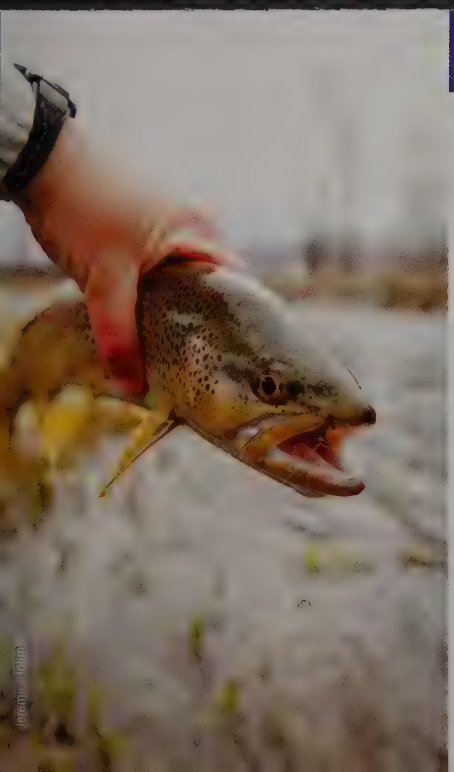
RADD ICENOGGLE
Evening hatch on the Bitterroot River

DENVER BRYAN
Fishing above a beaver dam

CHRIS MCGOWAN
Rainbow trout below Hauser Dam







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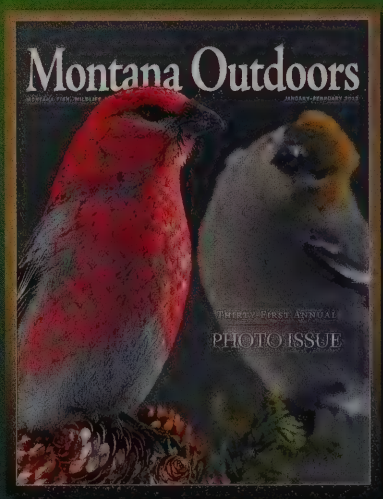

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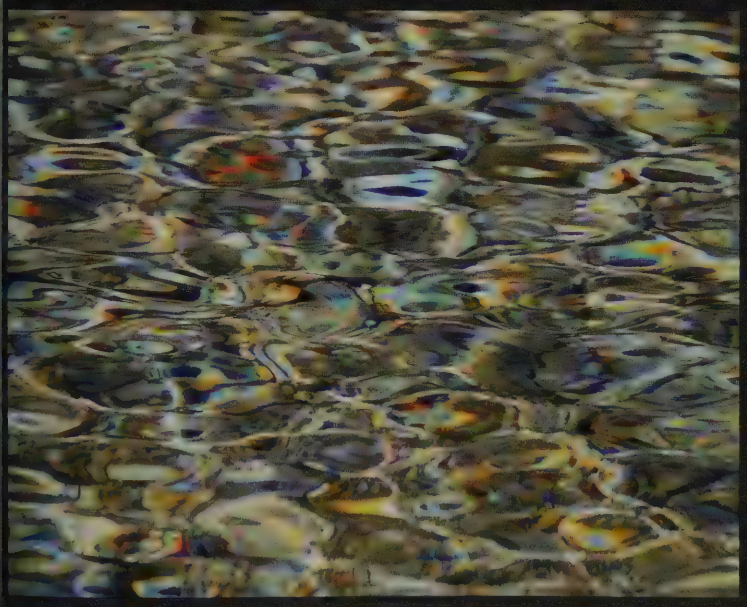


Clockwise from top:

CAROL POLICH
Madison River

SUMIO HARADA
Watercolors

ROWAN NYMAN
Bear Trap Canyon
Madison River

ROBIN POOLE
Bighorn River

lush, even as forbs and brush on distant foothills wither in the summer heat. Plants above and below water make homes and food for insects that feed fish, which in turn attract piscivores like mink, otters, herons, kingfishers, and osprey. Along low shorelines, spring floods spread layers of silt where cottonwood seedlings sprout and grow into towering trees that hold eagle nests.

On trout streams an angler finds harmonies of color and tone. The water runs red, gold, slate, or aquamarine. Its surface can reflect sky, trees, clouds, sunshine, even moonlight, creating two views for the price of one.

Just as the current never stands still, so does the scenery constantly unfold, each bend revealing new vistas. Often distracted and unfocused, I rarely see wildlife when afield—except when pursuing trout. Then I'm like a cougar stepping cautiously from rock to rock, careful not to spook my quarry. Peering ahead, I search for new runs and riffles, or an undisturbed pool where a few stout fish have moved up from dark water to gulp struggling insects floating overhead.

In this manner I've come upon a doe and her twin fawns in the morning fog. Otters and mink, too, as well as a grizzly bear sniffing streamside shrubs in search of berries. I once spotted a

juvenile bull moose crossing midstream. I crouched to blend with the surroundings and watched as he ambled up the bank and melted into evergreen shadows, surprisingly silent for such a massive, awkward-appearing animal.

What we value in streams and rivers derives in large part from western Montana's geology. Mountains that formed eons ago hold snowfields well into summer, the steady runoff keeping valley water cool while nearby grasses wither. In some headwaters, springs bubbling up through limestone bedrock leach calcium carbonate left from shells of ancient marine life when the region was a vast ocean floor. The calcium jump-starts a food chain producing trout at its later stages, and then the raptors and land predators seeking those fish.

And credit for retaining this lovely trout water surely goes to the Montanans who for decades have worked to conserve its beauty and health. And to maintain public access to our state's priceless and unownable rivers and streams.

"I salute the gallantry and uncompromising standards of wild trout, and their tastes in landscapes," wrote the conservation writer John Madson. Though the fish themselves may be the main attraction, the sweet surroundings are what continue to draw many of us back, no matter what mood the trout are in.

clockwise from top left:

ALEC UNDERWOOD
Rock Creek

JOSHUA BERGAN
Willow Creek

BEN PIERCE
Fighting a Yellowstone cutthroat

JOHN JURACEK
O'Dell Creek near Ennis

A Fresh APPROACH

Tips on keeping fish tasty for the table

By Jim Vashro

Each fall hunters go afield with friends and family hoping to fill their freezers with tasty venison. Many will argue endlessly over whether to bleed downed animals, how long to hang the carcass, and when to skin it. But discriminating hunters, not to mention meat processors, agree that the best way to get quality venison is to dispatch the animal quickly and field dress and cool the carcass as soon as possible.

So why don't more anglers treat their fish that way?

Anyone lucky enough to have enjoyed a shore lunch on the edge of a stream or lake, eating a fish so fresh it curls up after hitting the hot oil, knows how indescribably delicious fresh fish can be. Many anglers, hoping to repeat that culinary delight, will pack home a catch of fish. Months later they dig out from the bottom of a freezer a frost-encrusted package containing tasteless, rubbery fillets.

You can prevent that from happening by following some easy tips on fish preparation and preservation that I've learned after more than six decades of fishing and eating fish.

The surest way to ruin your catch is to carry uncleaned fish in a creel, on a stringer, or on a willow branch all day—especially in summer. The same holds true for staking fish on a stringer in the shallows. Those fish slowly suffocate as they thrash in the sun-warmed water, their gills filling with silt. Even a fish thrown in a bucket of water doesn't keep well. In a test I did years ago at a hatchery, most fish on a stringer or in a bucket were dead within 15 to 30 minutes. Just as important, most of the surviving fish that I released after that treatment died later.

"But I've got a boat with a livewell," you say. Studies at bass tournaments have shown that livewells full of fish quickly run out of oxygen. That's why tournament anglers use automated livewells that replenish water every few minutes. For the average angler who can't—or forgets to—keep fresh water flowing into the livewell, that container ends up as nothing more than a big, fancy bucket. Used like that, a more descriptive term would be a "slow-death-well."

Consider a trout hauled up from a depth of 20 feet and placed in a livewell. The surface water in that container is probably 20 degrees warmer than down where the fish had been swimming. A fish's metabolism roughly doubles for every 10 degrees the water temperature rises. So now you've got a fish with a revved-up metabolism in water that's slowly losing oxygen. Add to that the bumping and banging the fish endures as the boat moves over the water. That combination quickly stresses the fish and causes it to start suffocating in water too warm to preserve it.

A neighbor once brought over some lake whitefish he was having trouble filleting. The delicate meat of those fish, which had

PHOTO COURTESY JIM VASHRO

been kept in a livewell for several hours, turned to mush under our knife blades.

Treat like raw hamburger

The best way to keep fish tasting their best is to dispatch them at once and get them on ice as quickly as possible. This is what commercial anglers do with tuna, swordfish, and other high-value food fish. I call the process "Bonk, bleed, gut, and chill."

Step one is to kill the fish with a sharp rap to the back of the head (bonk). That either kills the fish outright or stuns it until it dies. A live fish bouncing around in a cooler or on shore bruises its delicate meat and fills with adrenaline and lactic acid that spoil the taste. Besides, quickly dispatching any animal you harvest is the ethical thing to do.

Fish have a simple nervous system, and their heart keeps pumping for a few minutes after death. After you bonk the fish, immediately bleed it by lifting each gill plate and cutting straight through the gills. Then put the bleeding fish in water or somewhere else where it doesn't make a mess. Bleeding out helps the flesh taste better and keep longer if you're not planning to eat it immediately.

After a fish dies, half-digested food and digestive juices in its stomach start seeping into surrounding tissues. Get the guts out quickly, including the bloodline along the meat by the backbone. The bloodline is the fish's kidney, and it is full of wastes filtered from the blood.

The last step is to quickly cool down the fish. The best use of your livewell is to fill it with crushed ice rather than water. I use a cooler containing chemical ice packs, which stay cold even longer than ice. After each fishing trip I scrub out the cooler and clean and freeze the packs for the next trip. When it comes to chilling my catch, I follow the advice of Montana outdoor writer Jerry Smalley: "Treat your fish like you treat your hamburger." When was the last time you staked a package of fresh burger in the warm shallows or let it sit in the sun for most of the day?

Fillet is the way

Unless I'm going to bake or smoke a fish, I usually fillet it using a razor-sharp fillet knife that has a thin, flexible blade. Filleting takes away all skin and bones, making the meat easier to eat, removing more fat-soluble contaminants, and reducing bulk for storage.

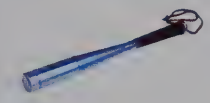
Fish are best eaten fresh, no more than two days after being caught. If that's not possible, freeze them in a little water in a plastic bag, squeezing the air out as you seal it. Air around a frozen fillet causes the meat to dehydrate and toughen, known as "freezer burn." Another option is to vacuum-seal fillets. Note that even when frozen in water or a vacuum-sealed pack, the oils in fish flesh continue to slowly deteriorate. I date all my packages and try to consume fillets within a month or two.

Many Montana waters contain contaminants that can accumulate in larger, older fish or species higher in the food chain. Do an Internet search for "Montana fish consumption advisory" to get the booklet pdf showing state waters with consumption warnings.

Eating fish is a delicious, time-honored tradition among anglers. If you choose to keep some of your catch, you will honor the fish and your palate by following these simple tips for keeping the meat as fresh and delectable as possible.

After 31 years, Jim Vashro recently retired from his position as FWP fisheries manager of Montana's northwestern region.

4 STEPS TO FRESH FISH



1. BONK
Kill the fish with a sharp rap to the head.

2. BLEED
Cut through the gills to drain the blood.

3. GUT
Remove the guts and bloodline.

4. CHILL
Immediately cool down fish on ice.

If releasing your fish, be prepared

Years ago, most anglers kept most of the fish they caught. With the popularity of catch-and-release fishing over the past few decades, most anglers today release their fish, even when it's legal to keep some.

To give your released fish the best chance of surviving, follow these simple guidelines. Foremost is to release the fish without removing it from the water if at all possible. That is made easier by using soft or rubber-mesh nets that gently hold the fish in the water while the hook is removed. If you want to land the fish for a photo or measurement, be prepared ahead of time. The time to start looking for a pliers, camera, and tape measure or scale is not when the fish is bouncing on the gravel or boat bottom. Hold the fish horizontally, lift it out of the water for a quick shot, and promptly send it back on its way.

How long is too long to keep a fish out of water? When you lift a fish out of water, start holding *your* breath. When you need to breathe, that fish *really* needs to breathe and should be immediately returned to the water.

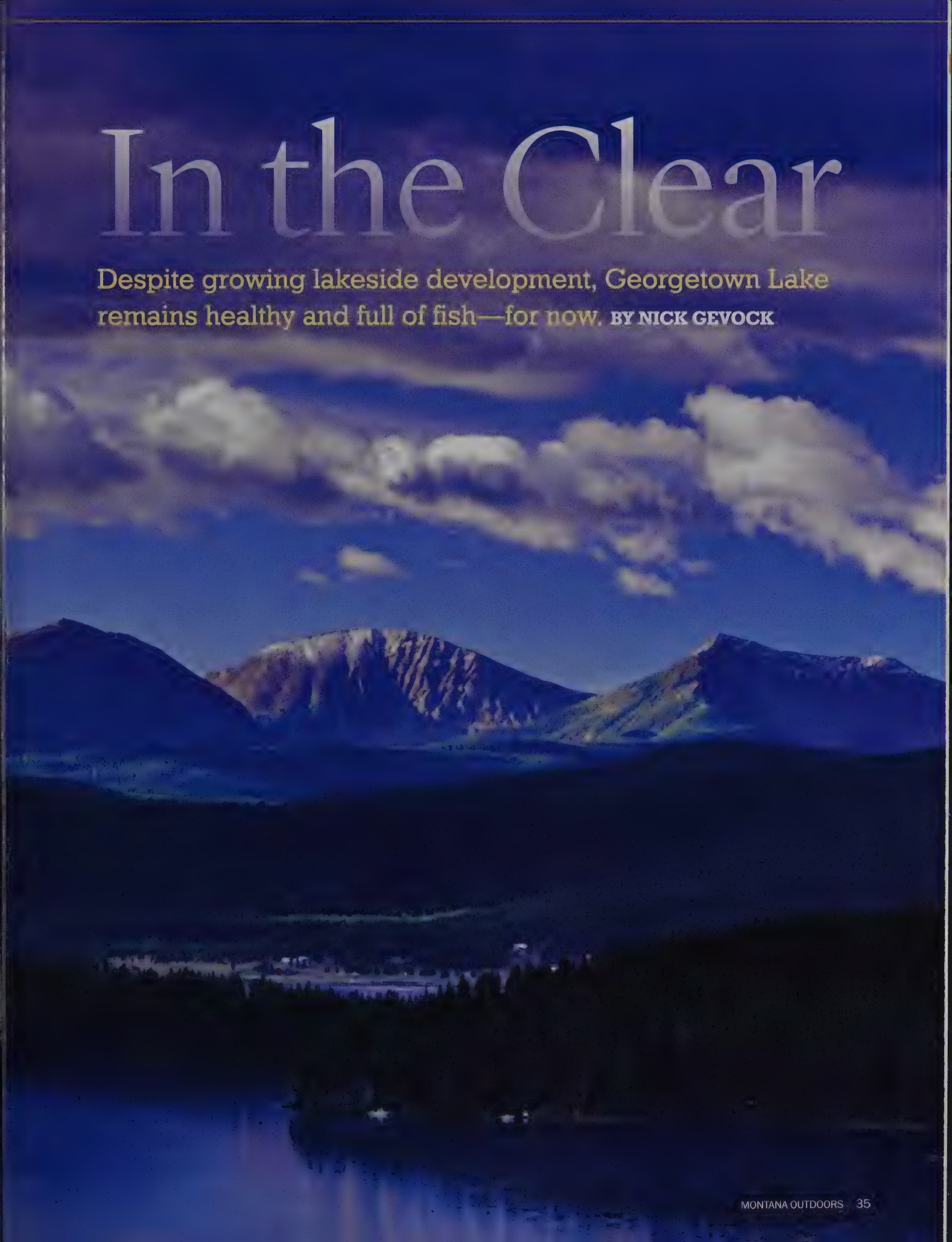
It's not required in Montana, but using barbless hooks—and replacing the barbed treble hooks on lures with single barbless hooks—makes it far easier to return a fish to the water with less harm.

PHOTOS, TOP TO BOTTOM: PICTOSPAN; KERSHAW KNIVES; SHUTTERSTOCK; SHUTTERSTOCK; BARRY & CATHY BECK

NO WONDER Georgetown Lake's appeal is apparent at first glimpse. Located 47 miles west of Butte, the reservoir is a scenic recreation destination framed by the Pintler (shown here), Sapphire, and Flint Creek Mountains. Photo by Chuck Haney.

In the Clear

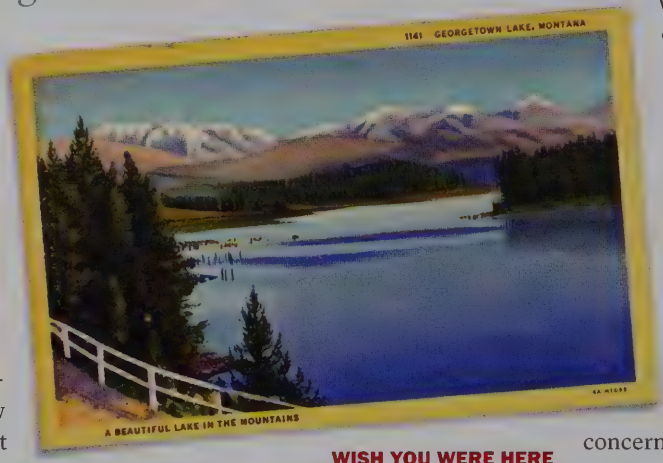
Despite growing lakeside development, Georgetown Lake remains healthy and full of fish—for now. BY NICK GEVOCK



Steve Luebeck of Anaconda grew up fishing nearby Georgetown Lake. He's seen it change through the years, with more anglers and, especially, more shoreline houses. But one thing has remained the same: Georgetown continues to produce top-notch trout and kokanee salmon fishing for anglers of all abilities. "My kids have caught 20-inch rainbows right off the beach," says Luebeck. "You can walk right down to the lake and see big fish just cruising the shoreline."

It's been that way for decades. But in recent years, area residents have feared that Georgetown's great fishing might be threatened. Growing development has encircled the scenic, high-altitude lake with homes. With the additional housing have come dozens of new septic systems, which can leach nutrient-laden wastewater. In many lakes, the excess nitrogen and phosphorus can make water murky, grow thick mats of vegetation, and result in fewer fish.

Is that in store for Georgetown Lake, a picturesque mountain paradise and one of Montana's most productive and popular sport fisheries?



WISH YOU WERE HERE

Georgetown Lake has been attracting anglers, boaters, and scenery lovers since it was first impounded in the early 1900s.

Flooding the flats

Georgetown Lake is technically a reservoir, originally created in the late 19th century by impounding North Fork Flint Creek in a meadow known as Georgetown Flats. In 1901, Flint Creek Dam was enlarged by the Montana Water, Electric Power, and Mining Company to produce electricity for nearby mining operations. Today Georgetown's primary purpose is to store water for hydropower and downstream irrigation, as well as sustain a popular recreation lake for boating, swimming, and fishing.

State fish stocking records date to the 1920s, according to Brad Liermann, the local biologist for Montana Fish, Wildlife & Parks. He says that for years anglers were allowed a daily limit of ten fish or 10 pounds of fish, which resulted in high harvests that reduced the average size of rainbow trout to just 10 inches long. In the mid-1980s, FWP tightened the limit to five fish per day. Since then, says Liermann, the lake's rainbows have grown to average about 14 inches.

The shallow 2,088-acre lake is extraordinarily prolific, producing some of the best trout and kokanee salmon fishing in the state and attracting more angling pressure per acre than any reservoir in Montana. Georgetown consistently ranks in the top 10 most-fished waters in Montana.

The lake also attracts boaters, windsurfers, waterskiers, snowmobilers, and campers from throughout western Montana and beyond. With 25 miles of shoreline that winds along bays, inlets, and points, Georgetown is framed by the Pintler, Sapphire, and Flint Creek Mountains contained within the Beaverhead-Deerlodge National Forest. Tourists can take in the lake from the Anaconda-Pintler Scenic Route (Montana Highway 1) running along Georgetown's east shore. Though much of the lake's shoreline is private, visitors can find several U.S. Forest Service, FWP, and other campgrounds to set up a tent or park an RV.

Residents worry

Concerned that their increasingly popular lake was being loved to death, members of the Georgetown Lake Homeowner's Association began looking into ways to fund a water quality study. Their concern was that booming cabin and home development were overloading the water with nutrients. Too much nitrogen and phosphorus in a lake can boost the growth of aquatic plants. In winter, the abundant vegetation dies, which can cause fish die-offs due to oxygen depletion.

In 2009 Craig Stafford, a University of Montana researcher, began to study the lake's water quality with help from several of his former students. The project was funded through the Granite County Conservation District with a grant from the state Natural Resource Damage Program. The Montana Department of Environmental Quality contributed too. In addition to oxygen levels, Stafford and his crew measured nitrogen and phosphorous. They also

Nick Gevock, conservation director for the Montana Wildlife Federation in Helena, spent many days fishing Georgetown Lake while working as a journalist in Butte.

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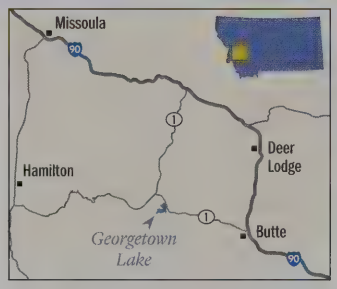
investigated the composition and concentrations of the water's phytoplankton and zooplankton—tiny plants and animals suspended in the water column.

FWP and graduate student researchers had previously accumulated extensive water quality data before the lake was heavily developed. "State biologists have been measuring winter dissolved oxygen levels since the 1970s," Stafford says. "We took various measurements over two years and compared them with the past data."

The research scientist found that, contrary to expectations, nutrient concentrations in Georgetown Lake's water have actually declined, leading to less phytoplankton and clearer water than in years past. What's more, recent FWP population surveys found that Georgetown continues to support abundant and healthy fish populations, though the average size of its kokanee has declined. Stafford suspects that the smaller size may be due to lower densities of zooplankton, the salmon's preferred food.

Stafford's project also called for mapping, from an airplane, the lake's abundant beds of whitestem pondweed and comparing the coverage to maps from 1975 and 1981 that were created by a Montana State University graduate student. He found that the amount of vegetation has expanded substantially over the past 30-plus years.



BUCKING THE ODDS Despite increasing numbers of homes popping up on the lake's shoreline (right), a new study shows that Georgetown Lake remains relatively clear (top). Big rainbow trout are often visible cruising the reservoir's shallows.

"That could indicate a shift in how the nutrients in the lake are being used, with more now in the form of aquatic vegetation and less in the form of phytoplankton," says the research scientist.

What about all those new septic systems? Though Stafford didn't evaluate the amount of nutrients added by the household wastewater facilities, he speculates that more phosphorus and nitrogen is entering the lake. But the additions have been more than offset by increased nutrient uptake by aquatic vegetation and the loss of nutrients when bottom water is released from the dam's base in winter.

Dodging winterkill

In the right amounts, aquatic vegetation is great for fish, says Liermann. "When a lake produces lots of plant growth, that produces lots of aquatic invertebrates, which in turn produce lots of fish," he explains. "It goes right up the food chain."

That's fine when plants are alive. But after vegetation dies, microbes consume it, using up the water's dissolved oxygen with their activity. This biological process rarely happens in summer and fall, when sunlight reaches underwater plants and wind stirs water, adding oxygen from the surface. But it often occurs in winter, when ice blocks

CLOCKWISE FROM TOP: ROBIN POOLE; ROBIN POOLE; MONTANA OUTDOORS

CLOUDIER PAST Several years ago (top), Georgetown's water was murkier than today. One reason for the change could be that nutrients are now being used by whitestem pondweed (left) rather than phytoplankton. Prudent winter water releases from the base of the dam (above) could help forestall fish die-offs once the vegetation dies.

sunshine and wind action ends. "Winterkill," common to ponds in eastern Montana, can result in large numbers of fish suffocating from too little dissolved oxygen.

As a shallow lake sitting high at 6,400 feet, Georgetown is sheathed in ice from mid-November to May. Fortunately no major fish kills have occurred over the past three decades. An important reason, says Liermann, has been the way in which water releases are managed. "One of the biggest causes of low dissolved oxygen levels in winter is too large of a drawdown," he explains. At the end of the ice season in April and May, only the top 3 feet or so of Georgetown's water column under the frozen surface contains enough dissolved oxygen for trout and salmon survival. "If the lake were drawn down just another 1.5 feet, that would take away 50 percent of the habitable water for these fish."

Liermann says FWP cooperates with the Granite County commissioners (the county owns the dam), Flint Creek Water Users, Georgetown Lake Homeowner's Association, and U.S. Forest Service on water management. "The goal has been to maximize pool storage before and during winter, while balancing other important water uses such as irrigation for downstream landowners," Liermann says.

Also keeping Georgetown healthy are two tributaries that provide fresh water to the lake as well as extensive groundwater that boosts dissolved oxygen in some spots.

Also, because water is released from the dam's base, some nitrogen and phosphorus that sinks to the bottom is regularly flushed out of the lake system. "Georgetown's bottom withdrawal may also be a factor in the paradox of declining nutrients in the face of increasing development," Stafford says.

But that could change, says Pat Saffel, FWP regional fisheries manager in Missoula. One major finding in Stafford's study is that Georgetown Lake's dissolved oxygen levels at the end of ice season have been falling over the years, perhaps as a result of more weed bed decay. "It's a very delicate system," Saffel says. "Additional [septic system] nutrients may not be in the water, but they are in the lake system as vegetation. When those plants die during a long winter with extended ice cover, we may see some severe dissolved oxygen depletion."

Different species

Georgetown Lake's rainbow trout, brook trout, and kokanee salmon fisheries remain productive. Liermann says rainbows of 15 to 20 inches are common, with an occasional fish reaching 22 inches, or about 5 pounds. He adds that FWP manages Georgetown Lake's rainbows as a harvest fishery. The department stocks roughly 200,000 rainbows

CLOCKWISE FROM TOP: RICK CLARK; *THE MONTANA STANDARD*; DONALD CAMERON

per year, and the fish grow fat in the shallow, productive lake. "We want people to be able to take fish home, so we let them keep five rainbows," Liermann says. "The only drawback is that when you let people keep that many, there's going to be a limit on how large the average fish size can get."

Luebeck, the Anaconda angler, says he mainly pursues rainbows, fly-fishing from a boat. "These are heavy fish that tend to put on more mass than river fish, because they don't have to fight current all day," he says. "At the hookup, there's a big, explosive run. You need an 8-pound-test tippet to handle those fish and muscle them up and out of the weeds."

Georgetown Lake also holds a healthy, self-sustaining population of kokanee salmon, another popular food fish. Anglers from throughout western and central Montana come to Georgetown to put the non-native fish in their coolers.

The trout and salmon draw anglers summer and winter. Ice anglers learn where underground seeps feed the lake with oxygen, causing fish to congregate. On winter weekends, portable ice fishing huts, makeshift shanties, and anglers braving the cold and wind dot the lake's eastern side just off Montana Highway 1.

Anglers looking for trophy trout focus their attention on the lake's non-native brookies. A smaller species than the rainbow, brook trout in most lakes rarely reach 14 inches. In Georgetown they can top 20 inches. "I don't know of any easily accessible lake in Montana where you can catch brook trout that big," Liermann says.

Luebeck recalls a day two summers ago when his son's friend pulled in a brookie that weighed over 6 pounds. "It was a world-class brook trout," he says. "I've never seen anything like it."

Liermann says that liberal limits during the late 20th century, and perhaps whirling disease in recent years, caused brook trout numbers to decline. In 2004, FWP instituted catch-and-release-only regulations on the colorful eastern United States native and began supplementing the population with hatchery fish. Within less than a decade, numbers had increased tenfold. The department then began to allow anglers to keep two brook trout as part of the five-fish daily limit.

> "With this approach, the lake ends up with the best of both worlds."

That may have been too liberal. Recent netting surveys suggest that Georgetown Lake contains fewer trophy brook trout since FWP began allowing anglers to keep two. Liermann says the department is considering dropping the limit to one brook trout per day or using some other more restrictive regulation in a further attempt to maintain or increase trophy-sized fish in the lake.

"People love this lake as a place where they can come up and catch rainbows and kokanee and take them home," Liermann says. "But with brook trout, we want Georgetown to be a place where you can catch a trophy. With this management approach, the lake ends up with the best of both worlds—two different fisheries for people who want fish for the freezer and another one for those wanting the brook trout of a lifetime."

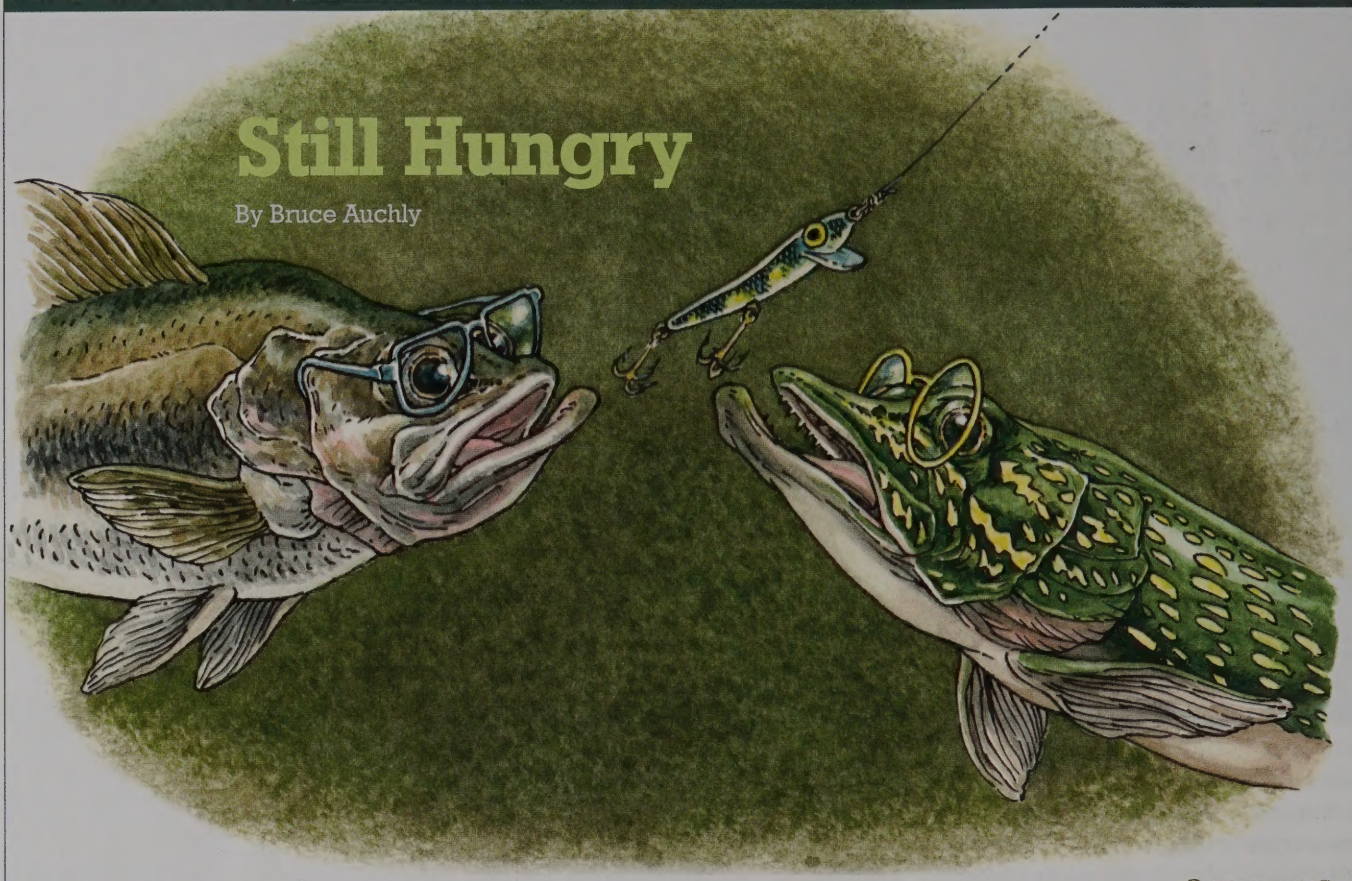
For now, Georgetown is able to produce this remarkable combination. Whether it can continue doing so may depend largely on how many people build homes on the scenic lake's shoreline and whether those who use its water for a wide range of purposes can continue to work cooperatively.

FAMILY FRIENDLY
Despite increased housing and boating, the Georgetown Lake area remains wild enough for wildlife and people to coexist. Offering spectacular scenery and beefy trout, the lake continues to attract residents and visitors looking for lakeside living and camping in the mountains.

FROM TOP: STEVEN AKRE; ROBIN POOLE

Still Hungry

By Bruce Auchly



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It's runoff season, the time of year when snowmelt in the mountains and rain on the plains cause rivers and streams to run high, wide, and not so handsome.

Impatient anglers head to a reservoir or just downstream of a dam, such as Holter on the Missouri or Yellowtail on the Bighorn, where the river is not as roiled.

But most anglers prefer to sit out this time of year and wait for the water to drop and clear. They maintain that rivers are just too muddy for fish to see their bait, making them too hard catch.

True, to a point. Yet fish still have to eat.

How they find food depends on the species. Some, like catfish, sauger, walleye, and freshwater drum, are adapted to finding food in dark or turbid surroundings. Others, like northern pike, bass, and trout, depend mostly on sight in clear water. One clue to the importance of vision is the relative size of a fish's eye. Trout, goldeye, largemouth and smallmouth bass, and northern pike have large, prominent eyes they use to find food. These species are less successful locating a meal when a clear stream or river is muddy or "off color" (an odd term when you consider that clear is not a color).

Fear not, for these fish won't starve, though the luckless angler might. For instance, trout can go days without eating, especially in winter when their metabolism slows down. And even during runoff, they still feed even if their vision is obscured; they just aren't as efficient. Some trout in a muddy river will seek a spot where clear water enters, like from a spring or small tributary. Or they'll feed on larger prey that's easier to spot.

Even in the middle of a muddy stream, like the Smith River in May, people still catch trout, so obviously the fish are still attempting to eat.

The structure of a fish's eye limits its vision, even in clear water. According to one textbook, most fish are nearsighted, and the medium of water limits their vision to a maximum of 30 to 50 feet. Factor in the camouflage of prey species such as emerald shiners or perch, and many predator fish cannot see their quarry even 15 feet away. Just another reason why anglers need to cover as much water as possible. Sometimes you might have to put your lure, bait, or fly right in front of a fish's snout before it knows it's there.

Catfish, sturgeon, and burbot have relatively small eyes. That means they use other methods to locate food. Many of these bottom-dwelling fish have taste buds on their lips or head. Some species of catfish have taste buds over much of their body, including the barbels, mistakenly called whiskers.

The ability to sniff out food is important to these fish. Plenty of companies sell various types of "stink bait" for bottom-dwelling species such as catfish, carp, and suckers. Uncommon in Montana, the foul-smelling concoctions plastered on a treble hook are popular in the warmer waters of the Midwest and South.

Whether you want to hold your nose and go that route, or just toss out your favorite lure or streamer, don't let a little muddy water this time of year keep you from fishing. Fish gotta eat too.

Bruce Auchly manages the FWP regional Information and Education Program in Great Falls.

Western Painted Turtle

Chrysemys picta bellii By Laura Roady

A bump on a log this time of year may indicate a unique sign of spring: a western painted turtle, one of only three native turtle species in Montana—along with the snapping turtle and the spiny softshell turtle—catching some midday sun.

In late spring and summer, increasing numbers of painted turtles emerge from muddy pond bottoms and climb onto logs for prime basking sites. Sometimes a dozen or more will crowd along a sunny spot, staying dead still until the slightest movement on shore sends them tumbling back into the water for safety.

Scientific name

Chrysemys is from the Greek *khrysos*, for "golden," and *emys*, for "turtle." ***Picta*** is Latin for "painted," and ***bellii*** honors Thomas Bell, an English zoologist and world-renowned turtle expert of the mid-19th century.

Appearance

With such a name, it's no surprise the painted turtle is colorful. The olive green head, neck, tail, and legs are accented by bright yellow stripes. The plastron (shell covering the belly) has an agate-like pattern of red-orange, yellow, and green. The carapace (shell covering the back) is olive to black, with an under edge of red and yellow and plates (scutes) bordered with yellow.

Painted turtles can reach the size of dinner plates, with females larger (up to 9 inches long) than males (up to 7 inches long). Males can be distinguished also by longer front claws and a longer, thicker tail.

Habitat and Distribution

Painted turtles prefer the shallow water of lakes, ponds, sloughs, ditches, and sluggish streams and river oxbows containing a soft bottom and aquatic plants.

The species is found throughout Montana except in the Bitterroot Mountains along the Idaho border.

Food

These opportunistic omnivores eat whatever they can find: insects, snails, earthworms, frogs, tadpoles, aquatic plants, and small fish. The painted turtle prowls water bottoms, jutting its head into vegetation to stir prey out into the open water. Then it snaps up the prey with its toothless, sharp-edged jaws. To eat floating vegetation and aquatic insects, a painted turtle often swims along the water surface, mouth agape.

Predation

Just as painted turtles eat almost any prey, almost every predator eats painted turtle eggs and the soft-shelled young. Garter snakes, herons, crows, ground squirrels, skunks, badgers, and foxes gobble down the vulnerable hatchlings. Adults, heavily armored, are generally safe except from raccoons. When attacked, adult turtles kick, scratch, and bite, and when flipped upside down are able to right themselves.

Reproduction

A sexually mature (two- to four-year-old) male painted turtle typically initiates courtship by swimming after a mature (four- to eight-year-old) female and maneuvering in front of her with outstretched legs. He may stroke her head with his long claws. If the female is willing, the two sink to the bottom to mate.

In midsummer, the female leaves the pond and looks for a sunny, south-facing slope with soft soil to lay her eggs. After digging a hole roughly 4 inches deep and 2 inches wide with her hind legs, she lays 6 to 20 white, elliptical, leathery eggs, covers them with soil, and leaves the nest.

The sun warms the eggs while rain keeps them moist through summer. The average temperature of the nest determines the hatchlings' gender—warmer conditions produce more females per hatch and cooler temperatures favor male production. Hatchlings either leave the nest in autumn or wait until spring to head out on their own.

Behavior

In spring and early summer, painted turtles sunbathe on logs, rocks, and vegetation mats. The reptiles must bask to warm their cold-blooded bodies. Basking also rids turtles of parasites, such as leeches, which dry up and die in the sunlight.

To stay safe from predators, painted turtles usually bask on objects completely surrounded by water. Approach basking turtles carefully and quietly so they don't dive underwater and disappear from sight.

At night, turtles swim to the bottom and rest in mud. During winter, they burrow into the bottom and their metabolism slows. Unable to breath in mud, the turtles absorb oxygen through their skin and the lining of their throat.

Status

Water pollution and getting run over by vehicles are the turtle's main human-caused threats. The species is considered healthy and in no danger of decline in Montana.

A lookalike species is the non-native red-eared slider, a common pet store turtle illegally released in many Montana waters. The slider has a red slash along either side of its head and a spotted bottom shell.

Laura Roady is a writer in Bonners Ferry, Idaho.

JEREMIE HOLLMAN

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PARTING SHOT

SUN SPOT At Blue Lake, north of Big Timber, a western painted turtle basks on a log while largemouth bass cruise below. Learn about the native turtle species on page 41. Photo by Nick Fucci.

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